FLY A BACKYARD MIG page 48

RADIAL ENGINE GUIDE
SCALE POWER & BEAUTY

MODEL Airplane NEWS

SUMMER SNEAK PEEK!

50 GREAT NEW PRODUCTS

page 15

NEED FOR SPEED

Jet jocks turn up the heat!

EASY ARF MAKEOVER

page 106

FLIGHT TESTED

- R/C Nobler *40-Redesigned Classic*
- Super *Cub-Giant-Scale ARF*
- Four-Star *60-Fun Sport Flyer*
- Aircobra-Power *Slope Sailplane*

AirAGE MEDIA

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JULY 2003

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07

MODEL Airplane NEWS

JULY 2003 VOLUME 131, NUMBER 7

ON THE COVER: Bob Violett's scale F-100F comes in for a landing. This was just one of the incredible models at this year's Florida Jets; see Jerry Smith's coverage beginning on page 82 (photo by Debra Cleghorn).

FEATURES

CONSTRUCTION

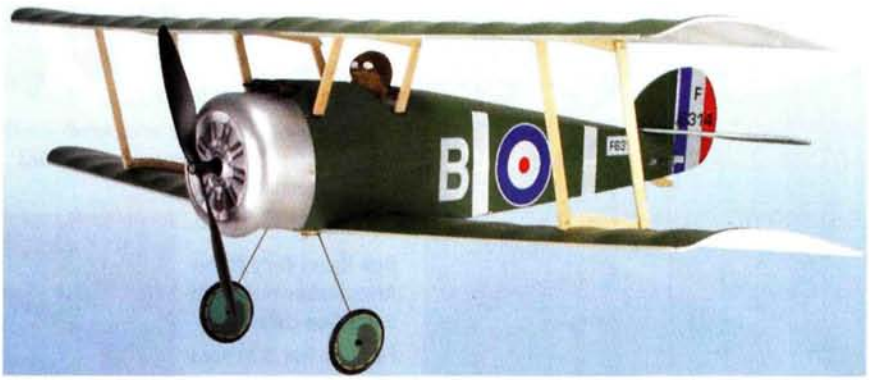
FLIGHT TESTS

COLUMNS

DEPARTMENTS

Latest and greatest in RC

Hundreds of new RC planes, engines and gear were released at this year's spring trade shows, pointing toward an incredible summer flying season. The success and popularity of almost-ready-to-fly (ARF) planes and backyard flyers are inviting more and more people to join the sport, and it seems as though everyone is excited about RC. It's interesting to note that the two areas enjoying the greatest



growth and development are at the opposite ends of the model-plane spectrum: giant-size aerobats and park flyers. The precision with which ARF models can be built today has led to an explosion of really big, really well-made ARFs, and the progress in motor and battery technology has ensured the success of dozens of small, electric-powered backyard and park models, as well as larger, 3D electric flyers. We're excited to showcase more than 50 of our favorite new products in this issue's special, eight-page version of "Scoop" entitled **"Summer Sneak Peek!"**, which starts on page 15. Whatever your pleasure, you'll find it here; enjoy!

ARF MAKEOVER

Love the convenience and great quality of today's ARF models but miss being able to come up with your own paint schemes, so you'll have a one-of-a-kind plane at the field? Check out associate editor Rick Bell's **"Painting Plastic Film"** how-to on page 106. Rick took his Great Planes "Red Baron" Dr.1 Triplane ARF and, with a scuffing pad and spray paint, turned it into a distinctive orange, white and green WW I fighter. Go on; give your ARF a makeover!

RADIAL ENGINES

We've all heard the saying, "Real airplanes have round engines and two wings." Well, not to knock biplanes, but radial engines certainly have a magic that nothing else can duplicate. It could be the way they sound, or they way they look; or it could just be nostalgia for bygone times. If you enjoy classic scale models and would like a powerplant that's worthy of your masterpiece, you won't want to miss senior tech editor Gerry Yarrish's **"The Magic of Radial Engines"** on page 74. Check out the lowdown on seven popular radial engines as well as how to keep your radial powerplant operating in perfect condition.

FREESTYLE AEROBATICS

Continuing in his popular series on Freestyle Aerobatic Techniques, **Quique Somenzini** this month shares his 3D setup secrets, including control-surface size and deflection, center of gravity and exponential and dual rates. Having the right model setup is the first step to 3D aerobatic success; see Quique's article on page 90, and get started right.

MODEL Airplane NEWS
FOUNDED 1929

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AEROBATIC ARFS

I liked the "Editors' Top 10 Picks" in the June 2003 issue but was surprised not to see my favorite model, the 80-inch-span Sig Sukhoi! I put a Saito 1.70 radial engine in its nose, and this plane performs! It also looks and sounds great. I really enjoy the aerobatic articles (reviews and how to's) and would like to see more in future issues. I enjoy the magazine; it's my favorite! [email]

PHIL HIZA

Phil, it was really hard to narrow down all those great aerobatic ARFs to only 10! We agree that the Sig Sukhoi is awesome; our West Coast associate editor John Reid reviewed it for the February 2003 issue and stated: "Flying the Sukhoi is the best part of owning it!" DC

LOOKING FOR A B-36

Thanks for producing the best model airplane magazine on the market. Each issue is packed with everything that a beginner or old-timer like me needs to know, from tips and tricks to new products. In the April issue, you covered the 2002 NEAT Fly-In. I noticed that a flier had an electric version of the B-36 Peacemaker built from Gus Morfis plans. I have searched all of my magazines (I don't throw them away; I just keep re-reading them until the covers fall off; thank goodness for plastic tubs!) but I can't find any listing for Gus Morfis plans in any magazine or on the Internet. I would like to purchase those plans, if they are available. Thought you might have a source for them. [email]

RONNIE BARBER

Thanks for the encouragement, Ronnie. You can reach Gus Morfis at (310) 378-5679, or by email at morfisg@turnkeyrc.com. After you've built the B-36, please send us photos for "Pilot Projects," and check out the RCStore (rcstore.com) for more plans from Gus. DC

TWO-PLUG HEAD?

Some engines are equipped with a twin-plug head for RC pattern and helicopters. I have been told that you need different glow plugs, such as O.S. "F" and "A5," for best engine operation. What advantages are gained by using twin plugs, and why must they be different?

K.T. SO
HONG KONG

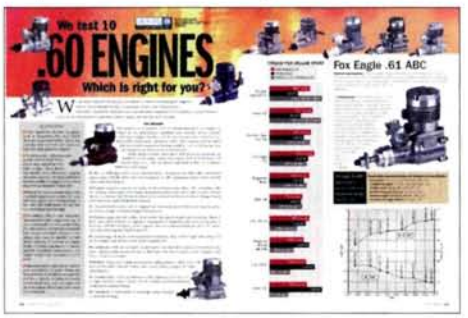
K.T.; twin glow plugs were first used in control-line speed and racing events in the late '40s. The idea was basic: if the plug burned out during the start period, it didn't need to be replaced: simply switch the glow-plug clip to the second plug.

Over the years, some experts have claimed

improved idle and throttle-up performance by using two glow plugs in the head. When the throttle is snapped open, a rush of incoming air flushes a load of liquid fuel (which often accumulates in the crankcase of an idling engine) into the combustion chamber, extinguishing the glow plug. Statistically, a second glow plug improves the likelihood that combustion will continue during such circumstances. This is another example of treating the effect rather than the cause; use of the idle-bar glow plug is another. Dynamometer testing of twin-plug 2-stroke engines has never shown torque or brake horsepower improvement. I'll leave the explanation for using two different plugs to the smoke-and-mirror specialists. Dave Gierke

ENGINE SHOOTOUT

Kudos to Dave Gierke for his "We test 10 .60 Engines" article in the May 2003 issue! That's



the kind of information modelers like me really want and need. And who would have guessed that the inexpensive Tower .61 would have so much horsepower? Goes to show that you can't judge a product by its price tag.

BILL SHARPE
KANSAS CITY, KS

Daring to compare different .60 engines against one another ... damn, that's something I haven't seen in an RC magazine before. *Model Airplane News* has more [nerve] than [other RC magazines] any day. Keep it up! [email]

MICHAEL MANESS

We're glad you liked Dave's .60 engine comparison and hope you had a chance to check out the additional engine information at the Click Trip (modelairplanenews.com). It was a lot of work to break in, disassemble and test 10 engines, but I have a feeling that Dave "Mr. Dyno" Gierke enjoyed every minute of it! DC

LIKES THE MIX

Just wanted to drop ya'll a note and tell you how much I enjoy the magazine. I fly IMAC and also some electric and general for-fun-type RC. I really have enjoyed and been helped by your series on basic IMAC maneuvers (hope you'll publish a separate book with all the articles), and now the series on 3D is really interesting.

I don't do much electric (one airplane) but enjoy reading about other aspects of the sport; keep it up. The magazine has become head and shoulders above any other RC magazine available. You still have construction articles, ARF reports, some aerodynamic reviews and lots of good advertising. I enjoy reviewing the ads and seeing what's new and available. Thanks for a great magazine. Wish you could publish bi-weekly. [email]

RODNEY WREN

Sounds as though you enjoy the magazine as much as we enjoy producing it, Rodney! We are fortunate to have some of the best modelers and pilots in the country writing for us. But twice a month?! You're killing me! Between producing Model Airplane News, Backyard Flyer *and* RC MicroFlight, *our department eats, sleeps and breathes model airplanes (not a bad way to make a living, I'll admit!)*

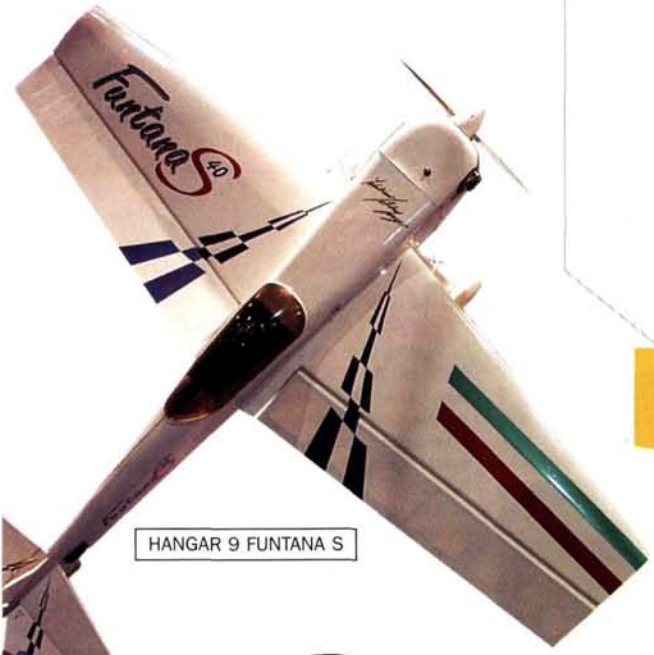
Glad to hear you like Quique Somenzini's series on freestyle aerobatics; check out his latest article on 3D aerobat anatomy and setup elsewhere in this issue. DC

YOU'LL SEE IT HERE FIRST! From park flyers to giant-scale aerobats, this year's flying season offers an unbelievable array of cool planes, gear and RC stuff. Here are more than 50 of our top picks of the latest and greatest releases.

GREAT PLANES GEE BEE

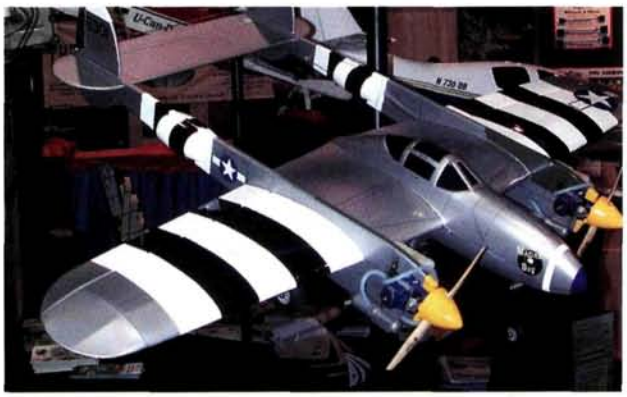
SUMMER SNEAK PEEK!

50 GREAT NEW PRODUCTS



HANGAR 9 FUNTANA S

ROBART TURBINE



GREAT PLANES PROFILE 38

FUTABA 6EXA RADIO

GWS SPITFIRE

EVOLUTION .61NT

GLOBAL HOBBY DISTRIBUTORS
SUPER DECATHLON ARF

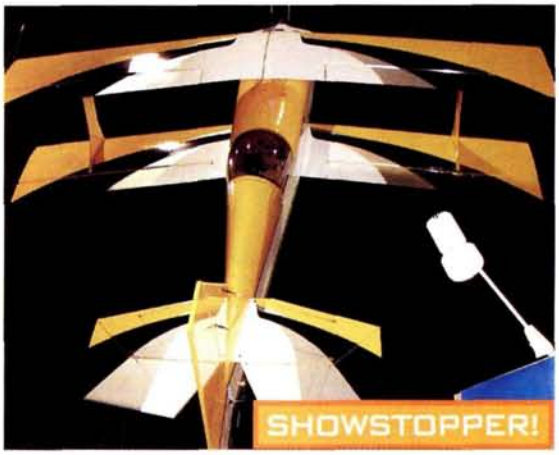
This scale beauty is constructed of balsa and plywood and covered with heat-shrink film. The kit includes fiberglass wheel pants and cowl with aluminum landing gears. Specifications: wingspan–63 in.; length–45.5 in.; wing area–641 sq. in.; weight–5.76 to 6.25 lb.; engine req'd–.52 to .61 2-stroke or .70 to .91 4-stroke; price–$179.99.

Global Hobby Distributors (714) 963-0329; globalhobby.com.

HANGAR 9
ULTIMATE BIPE 10-300ARF

Looking for competition-level performance and unlimited aerobatic ability in a giant package? Check out the Ultimate Bipe 10-300 from Hangar 9. Designed by eight-time Tournament of Champions competitor Mike McConville, it's both IMAC- and TOC-legal. Specifications: wingspan–98.5 in.; length–110 in.; wing area–3,310 sq. in.; weight–40 to 44 lb.; engine req'd–150cc to 200cc; price–$1,699.99.

Hangar 9; distributed by Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.



ESPRIT MODEL
LARK X AND LARK 3D

The Lark X is a very nice sport flyer with full 3D capabilities, and it's available in both ARF and almost-ready-to-cover (ARC) versions. Its fiberglass fuselage handles either a gas or an electric motor, while the rest of the kit's weight is minimized with light balsa construction. The Lark 3D (shown above) has been specially designed for heavy-duty aerobatic flying. Its larger wing area and greater control surfaces permit great 3D flying fun. Specifications (Lark X/Lark 3D): wingspan–59/51 in.; length–47/49 in.; wing area–720/750 sq. in.; weight–4.5 to 5.5 lb.; motor/engine req'd–Mega 22/30/3/ .35 to .40; prices–$219/$209 (ARF), $199/$189 (ARC).

Esprit Model (321) 729-4287; espritmodel.com.

DJ AEROTECH
BOEING B-17 AND RYAN ST

DJ Aerotech adds two new kits to its Roadkill series of planes: the Boeing B-17F and the Ryan ST. Both kits have profile bodies, laser-cut balsa and plywood parts and all the necessary hardware. The Boeing B-17 has a complete MPD-1A motor system, and the Ryan ST has the new MPD-2A motor system. Specifications (B-17/Ryan): wingspan–45.4 in./28.125 in.; length–33.4 in./20.25 in.; wing area–264 sq. in./118 sq. in.; weight–9.5 to 11 oz./4.5 oz.; motor–MPS-1A (included)/MPS-2A (included); prices–$124.95/$51.95.

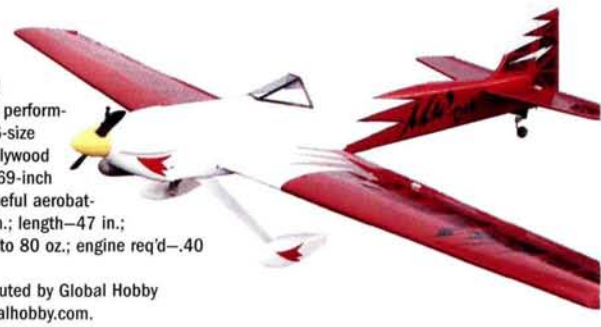
DJ Aerotech (937) 773-6772; djaerotech.com.

GREAT PLANES
SLINGER ARF

The popularity of flying wings is at an all-time high; with their light wing loadings and zippy performance, they offer a lot of bang for the buck. The new Slinger ARF from Great Planes captures these attributes in a colorful flying wing that is constructed of rugged expanded foam for durability and can be assembled in 30 minutes or less. Specifications: wingspan–47.5 in.; wing area–459 sq. in.; weight–23 oz.; motor–Speed 400 (included); price–$59.99.

Great Planes (800) 637-7660; greatplanes.com.

SPORTSMAN AVIATION
MAD DOG



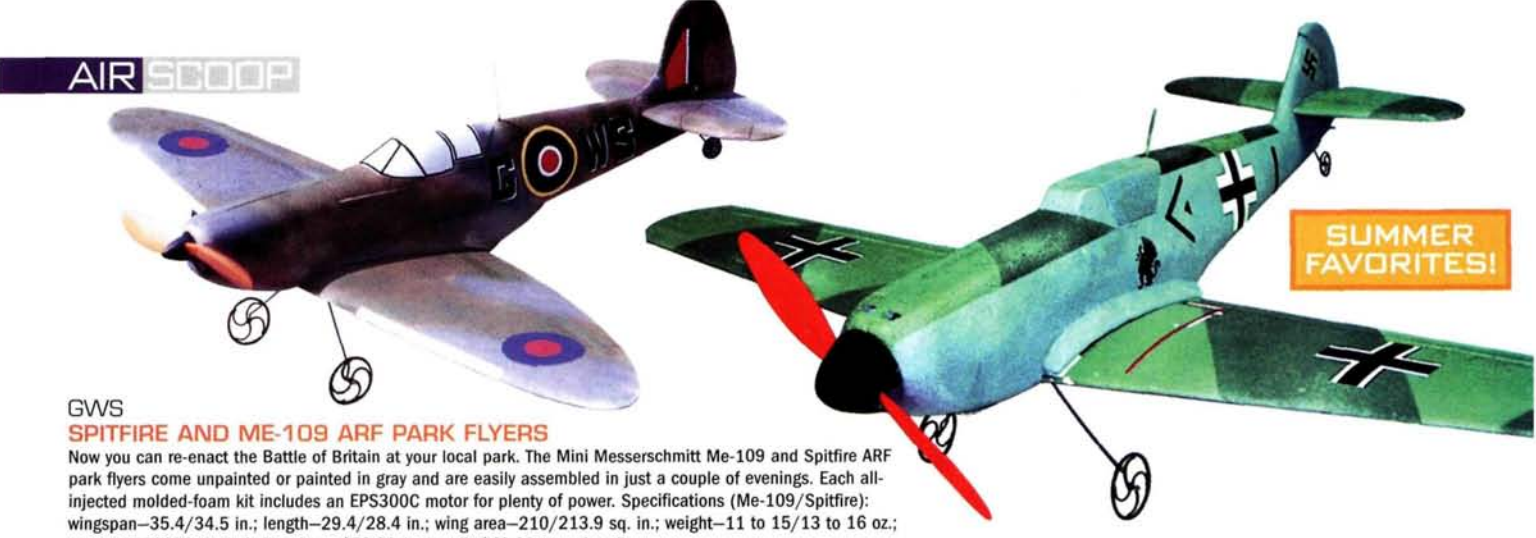
The Mad Dog ARF delivers polished flight without sacrificing impressive performance, and it does so with just a .46-size engine. Constructed of balsa and plywood and covered with iron-on film, this 69-inch plane will execute smooth and graceful aerobatics. Specifications: wingspan–69 in.; length–47 in.; wing area–595 sq. in.; weight–72 to 80 oz.; engine req'd–.40 to .46 2-stroke; price–$189.95.

Sportsman Aviation; distributed by Global Hobby Distributors (714) 963-0329; globalhobby.com.

WATTAGE
ODYSSEY

With its molded fuselage and built-up wooden wing, the Odyssey will get you up and flying in no time. WattAge has even included a motor, a gearbox and a propeller. Specifications: wingspan–33 in.; length–27 in.; wing area–165 sq. in.; weight–12 oz.; motor–Speed 180 motor/gearbox (included); price–$49.95.

WattAge; distributed by Global Hobby Distributors (714) 963-0329; globalhobby.com.



GWS
SPITFIRE AND ME-109 ARF PARK FLYERS

Now you can re-enact the Battle of Britain at your local park. The Mini Messerschmitt Me-109 and Spitfire ARF park flyers come unpainted or painted in gray and are easily assembled in just a couple of evenings. Each all-injected molded-foam kit includes an EPS300C motor for plenty of power. Specifications (Me-109/Spitfire): wingspan—35.4/34.5 in.; length—29.4/28.4 in.; wing area—210/213.9 sq. in.; weight—11 to 15/13 to 16 oz.; motor—EPS300C (included); prices—$59.99 (painted), $49.99 (unpainted).

GWS; distributed by Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.

HANGAR 9
CESSNA 182 SKYLANE ARF

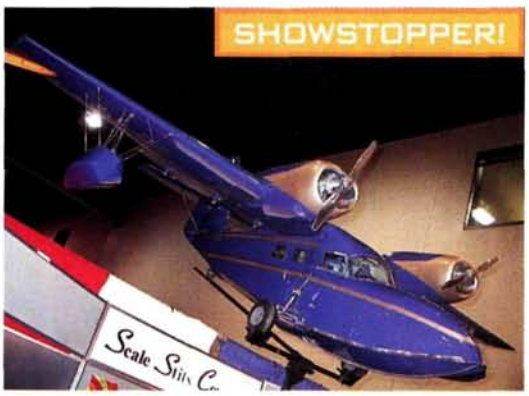
The Cessna 182 Skylane is faithfully reproduced in this stunning 1.50-size beauty from Hangar 9. The Skylane is loaded with scale details such as flaps, a painted fiberglass cowl, painted wheel pants and a detailed interior with instrument panel. Hangar 9 has even corrugated the aileron and elevator-control surfaces for maximum realism. Specifications: wingspan—94 in.; length—76 in.; wing area—246 sq. in.; weight—16.5 to 18 lb.; engine req'd—1.48 to 2.18 2-stroke or 1.50 to 2.00 4-stroke; price—$569.99.

Hangar 9; distributed by Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.

HANGAR 9
T-34 MENTOR ARF

One of the Navy's best primary trainers is now a .40-size semi-scale ARF from Hangar 9. The T-34 Mentor comes with plenty of scale touches, including an UltraCote trim scheme, a painted fiberglass cowl, a realistic canopy and, for maximum realism, there's even a retractable gear option. Specifications: wingspan—57.25 in.; length—45 in.; wing area—555 sq. in.; weight—6 to 7 lb.; engine req'd—.40 to .58 2-stroke or .56 to .72 4-stroke; price—$169.99.

Hangar 9; distributed by Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.



F&M ENTERPRISES
G-44 WIDGEON

Wow! Talk about making a splash with a plane. The new ¼-scale G-44 Widgeon from F&M Enterprises is big. The kit includes all fiberglass parts (fuselage, cowls, nacelles, tip floats) and a foam-cut wing and horizontal and vertical stabilizers. You can even add retractable landing gear and tip floats. Specifications: wingspan—120 in.; length—96 in.; wing area—2,203 sq. in.; weight 25 to 50 lb.; engine req'd—two Zenoah G38s; price—$1,200 (basic), $1,600 (combo kit w/two Zenoah G38 engines).

F&M Enterprises (817) 279-8045; stits.com.

JK AEROTECH
FOCKE-WULF TA 152

Are you combat-ready? If not, give the guys at JK Aerotech a call and ask about their new Focke-Wulf TA 152. Constructed of CNC-cut pink foam, this is the ideal plane for your next combat event. The kit includes corrugated plastic tails and fuselage doublers so it can survive the occasional impact during the heat of battle. It's tough enough to survive the day and come back for more. Specifications: wingspan—51 in.; weight—36 oz.; engine req'd—.25; price—$41.

JK Aerotech (503) 663-4081; jkaerotech.com.

OHIO MODEL PLANES
PROFILE YAK-54

This laser-cut balsa-and-ply kit features a unique foam-core fuselage that results in a strong, light structure—perfect for high-G maneuvers. It's easy to transport, thanks to removable wing panels, and the rudder and elevator servos are mounted on the tail to maximize control response and minimize slop. Specifications: wingspan—65.25 in.; length—59.5 in.; wing area—1,200 sq. in.; weight—6.25 lb.; engine req'd—.60 to .90 2-stroke or .90 to 1.20 4-stroke; price—$135.

Ohio Model Planes (937) 429-3056; ohiomodelplanes.com.

HOBBYZONE
FIREBIRD COMMANDER AND FIREBIRD OUTLAW RTFS

Following in the footsteps of the very successful line of Firebirds, the Firebird Commander comes with a Smart-Trak control system that allows you to fly in either standard or expert mode. Even beginner pilots will be up and flying like the pro's in no time. After that, you can add exciting plug-ins such as a Sonic Combat Module and an Aerial Drop Module (both sold separately). Specifications: wingspan–40 in.; motor–Speed 380 (included); price–$109.99.

The Outlaw offers a very affordable introduction to RC flight, thanks to its twin-motor vectored-thrust arrangement. It comes with a transmitter with a 9V battery, rechargeable airplane battery and AC wall charger. Specifications: wingspan–27.25 in.; length–21.375 in.; weight–6.5 oz.; motor–Super 130 (included); price–$59.99.

HobbyZone; distributed by Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.

HANGAR 9
FUNTANA S .40 3D ARF

Based on the already successful Katana S TOC design, the large control surfaces and light weight of the Funtana S give it an impressive thrust-to-weight ratio and provide you with crisp control authority to perform torque rolls, harriers, blenders and anything else you can dream up. Specifications: wingspan–56 in.; length–56 in.; weight–4 to 5.5 lb.; engine req'd–.32 to .46 2-stroke or .40 to .72 4-stroke; price–$169.99.

Hangar 9; distributed by Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.

SHOWSTOPPER!

QUADRA AERROW
Q-250 BXR

Quadra has been a renowned name in big gas engines forever, and now, thanks to the new Q-250 BXR, it's a name in "little" gas engines, too! At 25cc, it's just right for those entry-level gas planes. It weighs 2.65 pounds without a muffler and cranks out 2.75hp @ 8,600rpm–just right for 18x6 to 18x10 props. And check out that finish! Price not available at presstime.

Quadra Aerrow (613) 264-0010; quadraaerrow.com.

SHOWSTOPPER!

FUTABA
6EXA RADIO SYSTEM

The big news from Futaba is the release of its newest feature-packed, inexpensive, 6-channel radio system. Like many of the higher end radios that cost hundreds of dollars more, the 6EXA features servo-reversing, dual rates, exponential, endpoint adjustments, digital trims and a host of other features. The system also includes an R127DF receiver and 4 S3004 servos. Price–$199.99.

Futaba Corp. of America; distributed by Great Planes Model Distributors Co. (800) 637-7660; futaba-rc.com.

HANGAR 9
P-51 ARF

Now you can own the legendary Mustang in a big way. The new Hangar 9 P-51 Mustang 1.50 ARF comes with a ton of scale features, such as installed retracts, scale flaps, trim scheme and detailed machine-gun ports on the wing. Specifications: wingspan–77 in.; length–68 in.; wing area–1,039 sq. in.; weight–13 to 14.5 lb.; engine req'd–1.20 to 1.28 2-stroke or 1.50 to 2.00 4-stroke; price–$499.99.

Hangar 9; distributed by Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.

SHOWSTOPPER!

GREAT PLANES
GEE BEE .60 ARF

There's no mistaking a Gee Bee for anything else at the flying field, and there's no mistaking the topnotch quality that goes into every Great Planes ARF. This nearly ¼-scale Golden Age racer comes with molded fiberglass parts that have been painted to match the Top Flite MonoKote covering. Specifications: wingspan–66 in.; length–46 in.; wing area–683 sq. in.; weight–10.75 lb.; engine req'd–.75 to .90 2-stroke or 1.20 4-stroke; price–$299.99.

Great Planes (800) 637-7660; greatplanes.com.

SUMMER FAVORITE!

WATTAGE
SOPWITH CAMEL ARF

Now you can go hunting for the Red Baron in your own backyard. This model features simple foam construction that's easy to repair and comes with a Speed 370 motor, a matching gearbox and a 10-inch prop. Specifications: wingspan–38 in.; length–25 in.; wing area–475 sq. in.; weight–10 to 15 oz.; motor–Speed 370 (included); price–$59.99.

WattAge; distributed by Global Hobby Distributors (714) 963-0329; globalhobby.com.

SUMMER FAVORITE!

GREAT PLANES
U-CAN-DO 3D ARF .46

Hot on the heels of its popular .60-size U-Can-Do is this smaller version–great news for those who own compact cars! Constructed of balsa and ply for light weight, this impressive model is covered in Top Flite MonoKote and has painted fiberglass parts to match the covering. Specifications: wingspan–56.75 in.; length–58.5 in.; wing area–904 sq. in.; weight–5.25 lb.; engine req'd–.32 to .51 2-stroke or .52 to .70 4-stroke; price–$159.99.

Great Planes (800) 637-7660; greatplanes.com.

JET HANGAR HOBBIES
F-14 TOMCAT, MW44 AND MW54 MK2

The folks at Jet Hangar Hobbies have three new products that will keep you on the cutting edge of RC flying. Their new Grumman F-14 Tomcat is designed for twin electric ducted fans (EDF). The F-14 kit incorporates laser-cut balsa and plywood parts, foam wings, stabilizers, dorsals and a 3-piece epoxy-fiberglass inlet system. Specifications: wingspan–54 in.; length–48 in.; weight–6.5 lb.; motors req'd–minifan 480/HW609; price–$295.

TECH BREAKTHROUGH!

The new Wren Turbine MW54 Mk2 quick-building kit will be an excellent powerplant for your next jet project. The kit includes all the parts needed and a step-by-step full-color instruction manual; even the assembly tools are provided. Specifications: thrust–12 lb. at 160,000rpm; diameter–3.5 in.; length–6.65 in.; weight–27.5 oz.; price–$1,595 (includes kit, ECU, pump and starter).

The Wren MW44 is the smallest production turbine in the world and is available as a complete package–factory tested and ready to run. Specifications: thrust–7 lb. at 190,000rpm; diameter–2.91 in.; length–5.91 in.; weight–16.23 oz.; price–$1,995.

Jet Hangar Hobbies Inc. (562) 467-0260; jethangar.com.

GREAT PLANES
PROFILE 38 TWIN KIT

Don't have time to build a full-blown twin-powered warbird? Designed for intermediate to advanced pilots, this quick-build twin features timesavers such as profile nacelles and interlocking slot-and-tab, balsa-and-plywood construction. Specifications: wingspan–50 in.; length–36.75 in.; wing area–416 sq. in.; weight–4 to 5 lb.; engines req'd–two .15 to .25 2-strokes; price–$99.99.

Great Planes (800) 637-7660; greatplanes.com.

TECH BREAKTHROUGH!

EVOLUTION ENGINES
NEW .40NT, .46NT AND .61NT

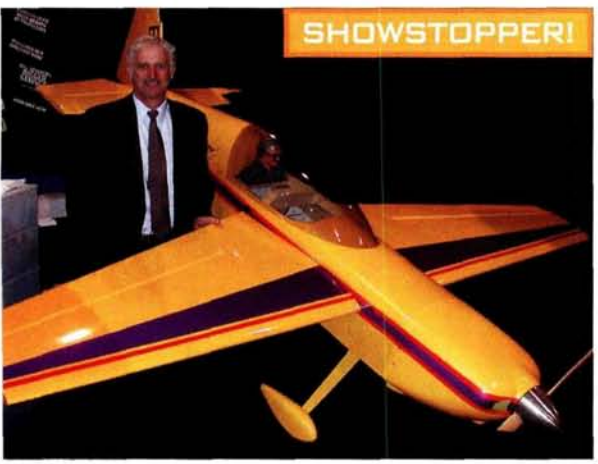
With SetRight needle-valve assembly to prevent overly lean o overly rich settings, beginner sport pilots will have less to worry about on their first venture into glow power. Veteran pilots will appreciate the dual ball-bearing crankshaft, canted glow plug and the fact that each engine has been engineered for maximum power output. Specifications (.40NT/.46NT/.61NT): weight–14.1 oz./13.1 oz./25.1 oz.; bore–.81 in./.86 in./.94 in.; stroke–.77 in./.80 in./.86 in.; displacement–.392ci/.476ci /.605ci; prices–$79.99/$89.99/$119.99.

Evolution Engines; distributed by Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.

MM GLIDER TECH
MARAUDER SAILPLANE

This all-wood design incorporates a high-aspect tail, generous wing area and the efficient E-195 airfoil—a combination that gives up nothing to its more expensive competition. It includes all die-cut parts and all the necessary hardware. Specifications: wingspan—115 in.; wing area—1,090 sq. in.; weight—60 to 70 oz.; price—$124.95.

MM Glider Tech (562) 927-2583; mmglidertech.com.



DAVE PATRICK MODELS
40% EDGE 540

This impressive ARF has a built-up fuselage with laser-cut parts and a balsa-sheeted foam aft turtle deck, plug-in foam-core, balsa-sheeted wing panels and tail surfaces and an outstanding hardware package, including new, giant-scale control horns. All hinges are the giant-scale pinned type and come ready to be glued into place. The fiberglass cowl and wheel pants are painted to match the UltraCote film covering. Specifications: wingspan—122½ in.; length—118 in.; engine req'd—Desert Aircraft DA 150; price—$1,499.

Dave Patrick Models (815) 457-2938; davepatrickmodels.com.

FALCON TRADING CO.
CESSNA ON FLOATS

This big floatplane includes some great scale touches, such as an airfoiled fin and stab, corrugated ailerons and molded scale landing gear. It also comes with wheels, and you can fly it off snow; in fact, you'll never want to stop flying this plane. Specifications: wingspan—67 in.; length—50 in.; wing area—680 sq. in.; weight—8.5 to 9 lb.; engine req'd—60 2-stroke or .91 4-stroke; price—$254.95.

Falcon Trading Co. (219) 942-1134; falcon-trading.com.

CERMARK
VA TESTER

With proper care, RC electrics are user-friendly and perform well. To that end, Cermark introduces its accurate and easy-to-use VA Tester, which provides modelers with a convenient way to monitor voltage and current in your power system. It supports 5 to 26 volts, 100 amps max current (70A continuous) with an accuracy of 0.1 volt and 0.1 amp, respectively, and provides an easy method for calculating draw, load and capacity. Price—$39.

Cermark (562) 906-0808; cermark.com.

BMJR MODELS
MILES MAGISTER

Designed by Dave Platt, the BMJR Magister kit features 126 laser-cut parts, a Du-Bro hardware pack, vacuum-formed parts, decals, yellow covering and photo-illustrated instructions. It was designed to be an exact 1/12-scale model, suitable for static display or for electric-powered RC. With 4-channel control, it's capable of all scale acrobatics. Price—$67.95.

BMJR Models (321) 537-1159; bmjrmodels.com.

KONDOR MODEL PRODUCTS
P-38J LIGHTNING ARF AND SEAFURY ARF

Need to escort a bomber through the hostile skies of your flying field? This P-38 kit has a fiberglass fuselage with balsa wing and tail. Pneumatic landing gear is included. Specifications: wingspan—82.7 in.; length—59.8 in.; wing area—911 sq. in.; weight—14 lb.; engine req'd—two .40 to .46 2-strokes or two .52 to .70 4-strokes; price—$499.

Also available is the Seafury ARF. It has the same high-quality construction as the P-38J Lightning. Pneumatic landing gear is included. Specifications: wingspan—71 in.; length—62 in.; wing area—1,190 sq. in.; weight—12 lb.; engine req'd—.90 2-stroke or 1.20 4-stroke; price—$389.95.

Kondor Model Products (807) 344-3625; kmp.ca.

MULTIPLEX
MICRO-JET

Spanning just 26 inches, the Micro-Jet is perfect for small-field flying. This high-strength foam model has 3-channel control and high-performance capability. The kit includes all the molded components, hardware, motor system and decals. Specs: wingspan—26 in.; length—23.6 in.; wing area—201 sq. in.; weight—15.9 oz;. motor included—Speed 400; price—not available at presstime.

Multiplex; distributed by Hitec RCD Inc. (858) 748-6948; hitecrcd.com.

TECH BREAKTHROUGH!

MULTIPLEX
ROYAL EVO12

When it comes to multi-channel mega-function radios, the Royal evo12 from Multiplex is king! If it comes in an RC transmitter, chances are good that the evo12 has it—12 channels (addressable to any control switch), channel synthesizer, giant high-definition display with variable inclination, digitally adjustable everything, easy programming with graphic display and much more. Exact prices vary with equipment packages, but you won't find more radio functions elsewhere at any price!

Multiplex; distributed by Hitec RCD Inc. (858) 748-6948; hitecrcd.com.

MRC/ALTECH
DJ-2 EZ ARF

The newest addition to the DJ series of ducted-fan models is the ARF DJ-2. The plastic molded fuselage is bonded to a laser-cut light-plywood frame for strength and durability. The wings are built of balsa and covered, and they're ready to be joined to the fuselage. Specifications: wingspan–44.7 in.; length–39.4 in.; wing area–573 sq. in.; weight–53 to 56 oz.; engine req'd–DFU2 ducted-fan unit (includes pull-start engine, fan, tuned pipe and hardware); price–$200.

MRC/Altech (732) 225-2100; modelrectifier.com.

JASON'S MODEL CONCEPTS
EXHILA E-35

Well known for his aerobatic expertise with giant-scale models, Jason Shulman is proud to announce the Exhila–the first in a series of electric aerobatic park flyers. The Exhila is fully 3D capable and can be flown indoors as well as out. This potent ARF model comes assembled and covered in three color combinations. Specifications: wingspan–35 in.; length–31.75 in.; wing area–255 sq. in.; weight–19 to 22 oz.; motor req'd–Speed 400 or equivalent brushless; price–$130.

Jason's Model Concepts; jasonsmodelconcepts.com.

PLANES PLUS
ECLIPSE

Looking for a championship-caliber F3A model? The Eclipse comes in kit, ARC and ARF forms, and it features a fiberglass fuselage and plug-in, balsa-sheeted foam-core wings and stabilizer. The small belly pan and removable canopy give full access to engine and radio compartments. Specifications: wingspan–73.6 in.; length–78.7 in.; weight–9.4 to 10.4 lb.; engine req'd–1.4 to 1.6ci; price–$595 (kit), $995 (ARC), $1,495 (ARF).

Planes Plus Inc. (630) 904-9983; planesplus.com.

ICARE
OCELOT-E

Pump up your adrenaline with this slope racer, now available with a fuselage that accepts your high-performance brushless motor. With its comfortable flight behavior, you'll be able to carve up the skies on your way up to altitude and then enjoy a relaxing thermal-hunting session. Specifications: wingspan–58 in.; length–37 in.; wing area–372 sq. in.; weight–22 to 33 oz.; motor req'd–Hacker 40-3; price–$289.

ICARE Sailplanes (450) 449-9094; icare-rc.com.

BALSA USA
S.E.5A

For some folks, nothing beats the flair and charisma of a WW I warbird. One of the most famous is the S.E.5a, and Balsa USA has a ¼-scale kit that will make biplane lovers drool. Balsa USA also offers a decal set, wheels and a scale machine gun to dress up your plane for competition. Specifications: wingspan–80 in.; length–63¾ in.; wing area–2,300 sq. in.; weight–18 to 20 lb.; engine req'd–25 to 35cc gas or 1.20 to 1.50 4-stroke; price–$295.95.

Balsa USA (800) 225-7287; balsausa.com.

MORRIS HOBBIES
VQ P-38 ARF

This built-up and fiberglass model features a 3-piece wing and accommodates Spring Air retracts. The covering is a heat-shrinkable vinyl that's available in three schemes, and an armament that includes bombs, rockets and drop tanks is available to dress up the Lightning. Specifications: wingspan–83 in.; length–56.5 in.; wing area–872 sq. in.; weight–14.5 to 16 lb.; engines req'd–two .61 to .91 2-strokes or .90 to 1.20 4-strokes; price–$799.99.

Morris Hobbies (800) 599-6887; mvvs.com.

SIG MFG.
BRISTOL SCOUT

Biplanes make great backyard flyers; the extra wing area really helps them slow down nicely yet remain stable. The Scout is made of tough expanded foam and comes complete with 180 motor, a gearbox and prop. Already have a Scout? Not to worry; Sig also offers a Curtiss Jenny ARF that comes with the same goodies. Specifications: wingspan–30.8 in.; wing area–301.5 sq. in.; weight–10.8 to 11.2 oz.; motor–Speed 180 (included); price–under $60.

Sig Mfg. Co. Inc. (641) 623-5154; sigmfg.com.

YELLOW AIRCRAFT INTL.
F-15C

The venerable F-15C has been a staple of the USAF for more than 20 years, but until now, kits to model your own have been few and far between. Yellow Aircraft aims to change that with the 1/5-scale, epoxy-glass F-15C kit for turbine or ducted fan. The kit contains all the little scale extras you've come to expect from a Yellow Aircraft product. Specifications: wingspan–56.5 in.; length–84 in.; wing area–1,055 sq. in.; weight–18 to 20 lb.; power req'd–two 15- to 22-lb.-thrust turbines; price–$1,090.

Yellow Aircraft Intl. (781) 674-9898; yellowaircraft.com.

WATTAGE
ULTIMATE 400 EP ARF

Here's a park-size biplane that doesn't sacrifice size for flying ability. The Ultimate 400 EP ARF is easy to assemble, so you'll be in the air fast. Once there, you'll enjoy the performance you expect from an aerobatic-style biplane. Specifications: wingspan–29.75 in.; length–30.5 in.; wing area–300 sq. in.; weight–31 to 35 oz.; motor–WattAge Super 400 cobalt (included); price–$199.95.

WattAge; distributed by Global Hobby Distributors (714) 963-0329; globalhobby.com.

HOBBY LOBBY
STREGA MINI RENO RACER

Designed for indoor and outdoor racing fun, the Strega is molded of painted foam for quick and easy assembly. With its aileron and elevator control, the Strega can easily be hand-launched and flown as a sporty park flyer. Specifications: wingspan–28 in.; length–26 in.; wing area–154 sq. in.; weight–7 oz.; motor req'd–GWS "A" drive; price–$79.

Hobby Lobby Intl. (615) 373-1444; hobby-lobby.com.

YELLOW AIRCRAFT INTL.
P-40E KITTYHAWK

Rule the skies in a big way with this early WW II fighter. The P-40E Kittyhawk 1/5-scale kit features a one-piece epoxy-glass fuselage with panel lines molded in and balsa pre-sheeted foam-core wings and stabilizer. Specifications: wingspan–86 in.; length–73 in.; weight–25 to 27 lb.; engine req'd–Zenoah G-38, G-45, or G62; price–$625.

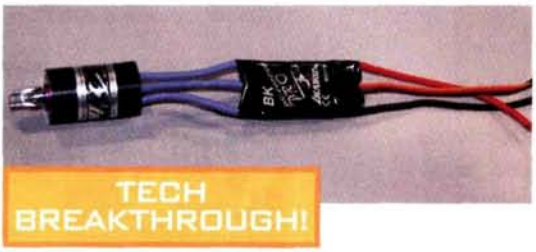
Yellow Aircraft Intl. (781) 674-9898; yellowaircraft.com.

TECH BREAKTHROUGH!

ROBART
FUNSONIC TURBINE

Robart Mfg. is now the exclusive North American distributor of the impressive, German-made FunSonic FS52AS turbine engine. Weighing a scant 1.5 pounds, the FunSonic turbine is only 3.2 inches in diameter, develops between 6 and 12 pounds of thrust and comes complete with a full auto-start system. The complete airborne power system weighs about 2.5 pounds and has an rpm range of from 52,000 to 160,000. Included with the turbine are a throttle control unit (TCU), a startup display unit (SDU), a fuel pump and 6V battery pack and all connections, mounting straps and screws. Price–$2,395.

Robart Mfg. (630) 584-7616; robart.com.



IKARUS
BRUSHLESS SET FOR PRO PICCOLO

Now you can upgrade your Pro Piccolo with this optional brushless set and place it in a class of its own. The phenomenal power achieved from this combination will give you incredible flight performance and a longer flight time. The set's price includes the pro ESC and brushless motor that runs with any battery (up to 13 volts) on the market.

Price–$299.

Ikarus (239) 690-0003; ikarus.net.

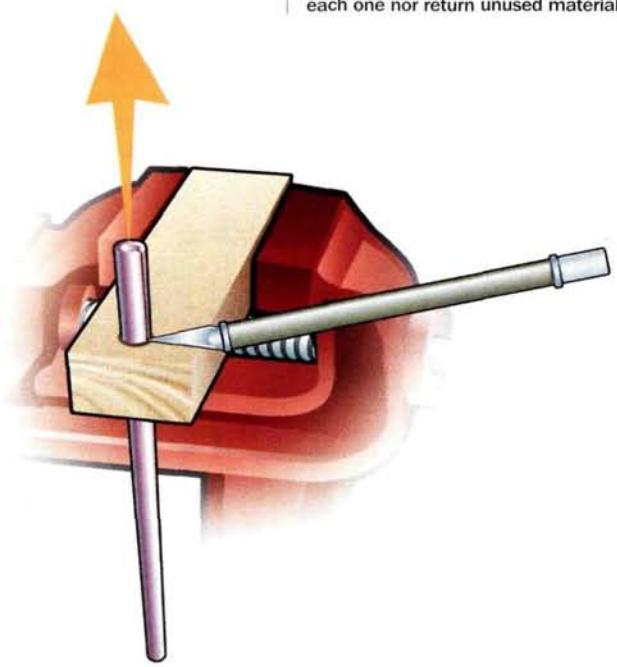
CLASSIC AERO
1/12-SCALE SIKORSKY S-39

There's no mistaking the look of a Sikorsky flying boat, and we're thrilled that Classic Aero has come out with a 1/12-scale, 52-inch version of the S-39 that's designed for electric power. The hull is vacuum-formed, and the complete airframe comes in at 3 pounds. Specifications: wingspan–52 in; weight–3 lb.; motors req'd–two Jeti Phasor brushless; price–not available at presstime.

Classic Aero (248) 969-8139; classicaero.com.

Illustrations by David Baker

SEND IN YOUR IDEAS. *Model Airplane News* will give a free, one-year subscription (or a one-year renewal, if you already subscribe) for each idea used in "Tips & Tricks." Send a rough sketch to *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can neither acknowledge each one nor return unused material.



MAKING THE CUT

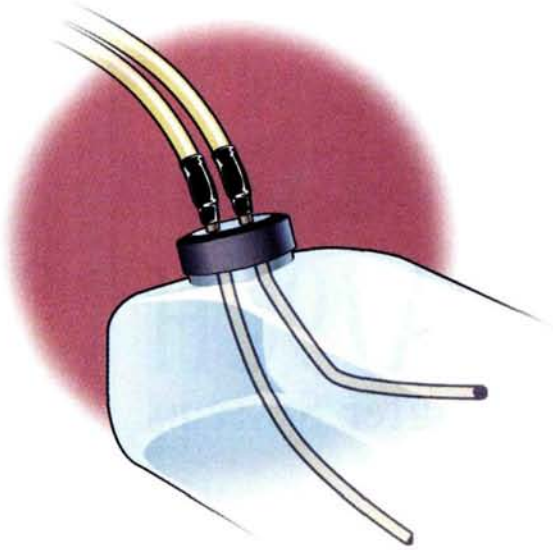
Ever need to make a slit in a piece of rubber or plastic tubing for cockpit coaming? Here is a simple way to make that cut perfect every time. Use a 2-inch-square piece of wood and drill a hole through it the same size as your tubing. Clamp the jig to the end of the workbench with the hole over the edge of the bench. Insert the tubing in the bottom of the hole until a small amount extends out of the top. Grab that piece of tubing and pull it up a little so you have a good finger hold on it. Punch the point of your hobby knife through one side of the tubing into the center. Now hold the knife down on the wood and pull up on the tubing to make a perfect slit.

Don Orndorf, Millersburg, PA

HOLD ON

One of the problem areas when installing a fuel tank is how to secure the fuel tubing to the inlet/outlet pipes so they won't slip off. Who wants raw fuel dumped inside the tank compartment? Prevent this from happening by cutting a ¼-inch-long piece of heat-shrink tubing that is a little bigger in diameter than the fuel line. Slip it over the end of the fuel tubing, and push both onto the tank pipes. Use your heat gun to shrink the heat-shrink tubing and create a nice, tight fit. Now you don't have to worry about the fuel lines popping off the tank inside your plane.

Glen Bolick, Mechanicsville, VA



EASY TO SEE

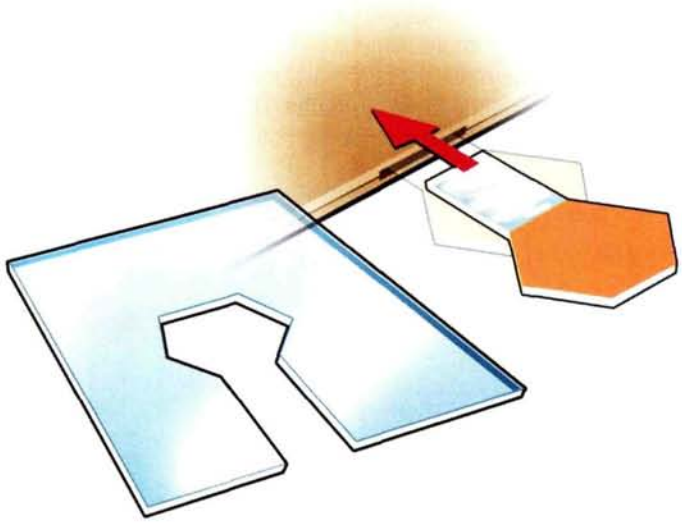
Installing a cowl in the sun seems like an easy thing to do. But have you ever noticed how the shadow from the cowl makes it very hard to see the attachment-screw holes in the fuselage? Add a small piece of white covering around the fuselage-attachment-screw holes, making them easier to see in the shadow. Use dark covering on a light fuselage.

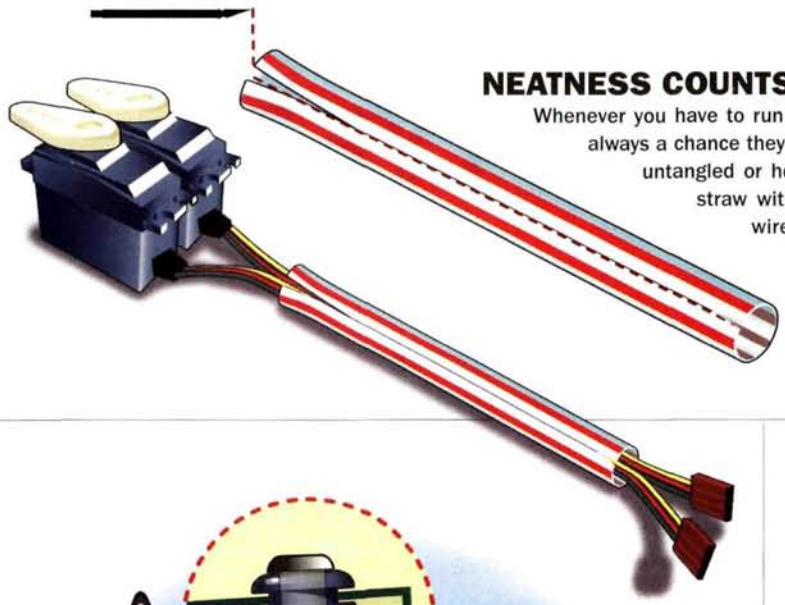
Johnny Eanes, Ridgeway, VA

KEY TO SUCCESSFUL HINGES

Here is a great way to get enough glue into the hinge slots and ensure a solid bond. Cut a thin, key-shaped glue applicator out of .015-inch plastic. Spread glue on both sides of the thin part of the "key," then insert it into the hinge slot. Work the key around, making sure you spread the glue to all corners of the hinge slot. Remove the key, and clean off any glue that has oozed out. Install the hinge and let it dry permanently in place.

William Watt, Chatham, NJ

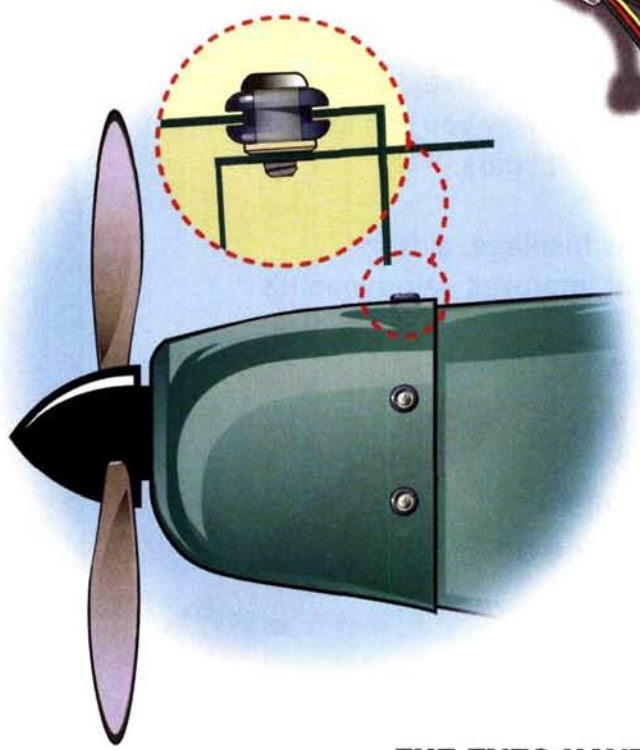




NEATNESS COUNTS!

Whenever you have to run servo wires or extensions in your model or field box, there is always a chance they can end up a tangled mess. An excellent way of keeping them untangled or held in place is by enclosing them in a rigid conduit. A plastic straw with a slit cut along its length is a great conduit for the servo wires. Just press the wire into the straw along the slit, the slit snaps back into shape and presto ... you have a nice straight run of wires. To remove a wire, just pull it back out through the slit. The straw can be left loose or spot-glued to the fuselage to hold a fixed position.

George Negraiff, Goderich, Ontario, Canada



THE EYES HAVE IT

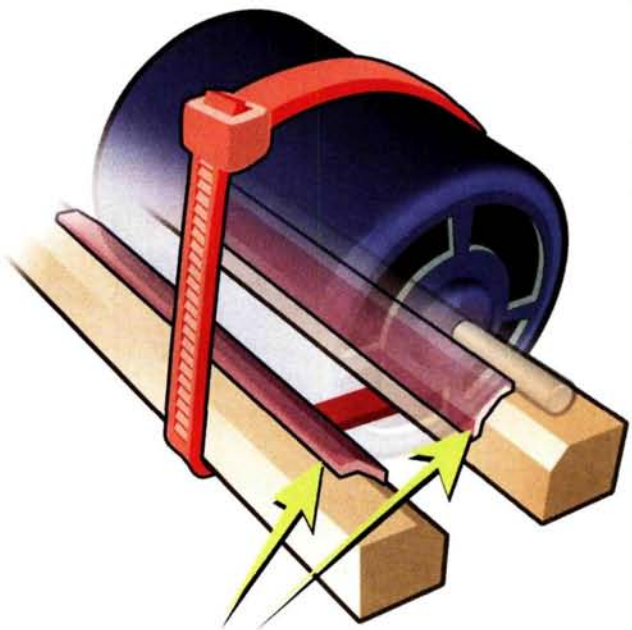
Here is a great way to prevent your cowl from cracking while also keeping that paint job like new. After you have drilled the mounting holes in the proper positions on the cowl, remove it from the fuselage and enlarge the holes to fit some leftover servo grommets. Install the grommets and the brass eyelets in the same way as you would in the servo (be sure to have the base of the eyelet on the inside of the cowl). Install the cowl with servo or washer head screws. Now you have a very durable and clean cowl attachment.

Robert F. Carlough, Hawthorne, NJ

ELECTRIC MOTOR TIE-DOWN

Electric conversions of gas-powered kits can be hampered by having to figure out how to install the motor securely. Here is a simple way to mounting a round motor on a square-beam mount. Bevel the inside of the beams with a 45-degree chamfer. Cut some strips from wide rubber bands and tack-glue them to the chamfer. Set the motor between the beams, and cinch it down with the cable tie. For larger motors, use a couple of cable ties for a secure hold.

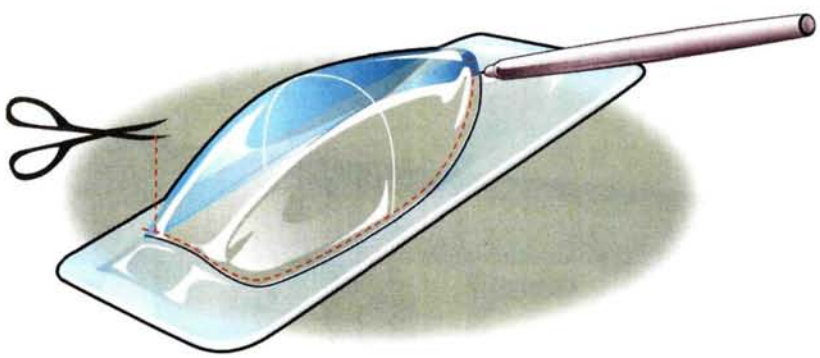
John L. Anderson, Farmington, NM



MAKING YOUR MARK

Are you tired of making mistakes while trying to follow those hard-to-see canopy scribe lines, especially when you cut them with scissors and you veer off course just a little? Make an easy-to-follow cut line by highlighting it with a black Sharpie pen. The Sharpie follows even the smallest indentation on the scribe line, producing a sharp and easy-to-see guideline. Now you have a highly visible edge to follow while you trim the excess material from the canopy. Once you've finished, remove any Sharpie black line left on the canopy with rubbing alcohol.

Charles Beck, Plano, TX



PILOT PROJECTS

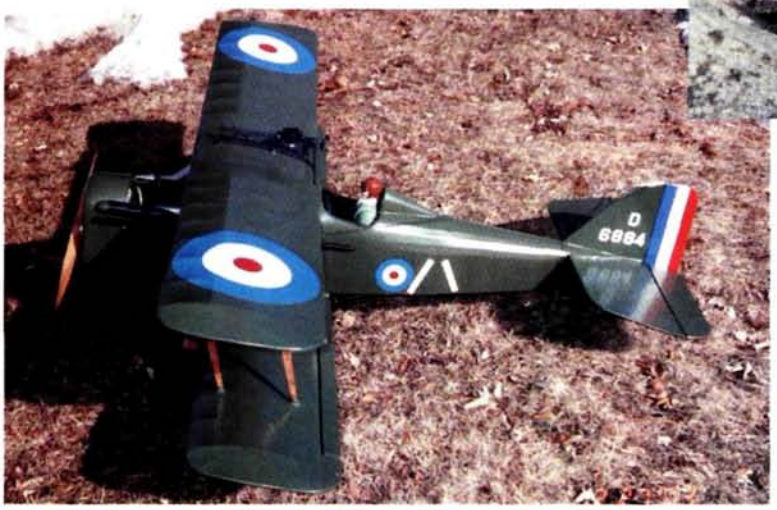
SEND IN YOUR SNAPSHOTS. *Model Airplane News* is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable but please do not send digital printouts. We receive so many photographs that we are unable to return them. All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of the year. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in! Send those pictures to "Pilot Projects," *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA.

Jim Morrow, Williams, CA
HAWKER SEA FURY

Here's a nice flightline shot of Jim's Top Flite .60-size Hawker Sea Fury. He powers his model, "Bad Attitude," with a Magnum 1.20 4-stroke. Jim's model features Spring-Air retracts and a Tru-Turn spinner, and as you can see in the photo, he incorporated flaps to help with those scale-like landings. Nice job, Jim!

Ted Cheever, Prescott, AZ
SCENIC STICK

We were overcome with envy when we saw photos of Ted's Hangar 9 1.20-size Ultra Stick floatplane—as much for his gorgeous Watson Lake flying site as for the plane itself! The Stick sits on Sig 46-inch floats, and a Moki 2.10 provides the thrust to get this 15-pounder off the lake. Ted uses Futaba gear to control his plane, which features flaps. He tells us he has been flying floatplanes for 30 years—no wonder, with a lake like that!



Darren Gibson, Eau Claire, WI
RAF SE-5A

Wisconsin winters are neither short nor mild (check out the snow in the corner of the photo), so Darren used the long off-season to build this Hobby Hangar SE-5a. He did his homework and then detailed his plane to resemble the D6884 model. Darren reports that this model, built by Wolseley Motors of Birmingham, England, was the 34th machine in the second production batch. Darren used Nelson Hobbies System Three water-based paint and Major Decals graphics. A Saito FA .72 powers the bipe, and it's controlled by Futaba gear.

Dave Giesbrecht, Langley, British Columbia, Canada
PETROL-POWERED PATTERN PLANE

Dave wanted an economical and practical model he could practice pattern aerobatics with and perhaps use in low-level competition. The result is the scratch-built "Super Octane," a 74-inch plane designed specifically to use the RCS 1.40 RE gas engine. The model has balsa and lite-ply construction, with balsa sheeted foam-core wings and tail. The RCS is slightly heavier than a comparable glow engine, but Dave values the increased reliability and lower operating costs, and the increased efficiency allows him to offset the weight by using a much smaller fuel tank.

George Wardleigh, Ogden, UT
DH112 VENOM

This unique warbird is George Wardleigh's 19-percent scale de Havilland DH112 Venom. He scratch-built this twin-tail model from 3-views; it has a 96-inch wingspan and weighs 28 pounds. A RAM 750 provides thrust and an authentic jet whine. George tells us that all the decals were printed off his PC—a graphic demonstration of the potential that this technique offers. George tells us that he has just finished the maiden flight and the Venom flew very well, needing only minor trim adjustments.

William Hobbs
Lancaster, CA
CURTIS P-6E

This Curtis P-6E, built from a Royal kit, proves that beauty isn't always only skin deep. Check out the engine installation; William used an ASP .80 4-stroke for power, and he mounted it so the rocker cover just fits into the rectangular opening. The ASP .80 has a fuel pump, and take special note of the shelf that William installed on the firewall to hold his remote glow igniter and remote fuel fitting so he could preserve the cowl. He didn't stop with the engine compartment, though; if you look closely, you can see the navigation lights he installed in the wingtips and tail.

Todd Howard, Morgan Hill, CA
SALVAGED SUKHOI

Most guys would have written off any model that went in as hard as Todd Howard's Sig Sukhoi SU-31 ARF did when it suffered an elevator hinge failure, but Todd isn't like most guys. Instead, he embarked on a 2-month-long project to reconstruct the fuselage, tail and one wing. The list of individual repairs is too long to itemize, though Todd reports that the work did increase weight in the tail. To offset this, he installed a larger fuel tank in front. The Moki 2.10 has plenty of power to spare, and the rebuilt plane has unlimited vertical performance and will hover at ¾ throttle. Todd reports that, amazingly, the repairs cost him only about $85—and a lot of hard work!

Robert Gillespie, Twin Falls, ID
MEMPHIS BELLE

Everybody loves the B-17, and Robert Gillespie has even more to love with his beautiful 78-inch Memphis Belle B-17E built from a Royal kit. This fantastic Flying Fortress boasts four O.S. Max .25 FX engines, and we bet they sound awesome at full song. The kit uses balsa plank-over-frame construction, is covered in fiberglass cloth and sports Spring Air retracts. The top gun turret can be rotated and elevated by RC, and this just adds to the spectacle whenever it flies at Robert's dry lakebed flying site southwest of Boise.

Henry Waters
Stratford, OK
GREAT PLANES STUKA

For 45 of his 84 years, Henry has been building and flying u-control and RC kit airplanes, but this Great Planes JU-87 Stuka is his first ARF. He remembers the devastation wrought by this fearsome dive-bomber in WW II, so it made sense to select it for his first ARF. It went together easily, and Henry tells us that it's like a baby pig: so ugly, it's cute! He powers it with a Saito FA .91S and controls it with a Futaba FP-T5. He reports that the 70-inch wingspan is perfect—big enough to see and small enough to handle.

Perfect for the bush pilot in all of us!

HANGAR 9 SUPER

SPECIFICATIONS

MODEL: Super Cub

TYPE: ¼-scale ARF

MANUFACTURER: Hangar 9

DISTRIBUTOR: Horizon Hobby

WINGSPAN: 100 in.

WING AREA: 1,294 sq. in.

WEIGHT: 15 lb., 9 oz.

WING LOADING: 27.7 oz./sq. ft.

ENGINE REQ'D: .61 to 1.48 2-stroke; 1.00 to 1.82 4-stroke

ENGINE USED: Zenoah G-26 (1.6ci)

RADIO REQUIRED: 5-channel w/7 servos (2 each for flaps and ailerons; 1 each for rudder, elevator and throttle)

RADIO USED: JR 10X w/7 JR servos

PROP USED: Zinger 18x8

FEATURES: the Super Cub has all-wood construction, fiberglass engine cowl and wheel pants, a vacuum-formed windshield and cabin windows and a complete hardware package including wheels and fuel tank. The tail surfaces are built up, and all hinges are in place ready to be glued. The main gear is aluminum, and dummy spreader struts are included for scale appearance. Lift struts come already built and ready to be bolted into place.

COMMENTS: covered with WorldTex fabric, the new Super Cub is a rugged and easy-to-build ARF that captures the allure of the full-size PA-18 bush plane. The model has plug-in wing panels and a beefy aluminum carry-thru tube. The flaps are effective and can really shorten takeoffs and landings. Powered with the new Zenoah G-26 engine, the Super Cub has spirited performance.

HITS

- Very quick to build.
- Nicely finished with fabric covering.
- Sturdy construction.
- Great flight characteristics.

MISSES

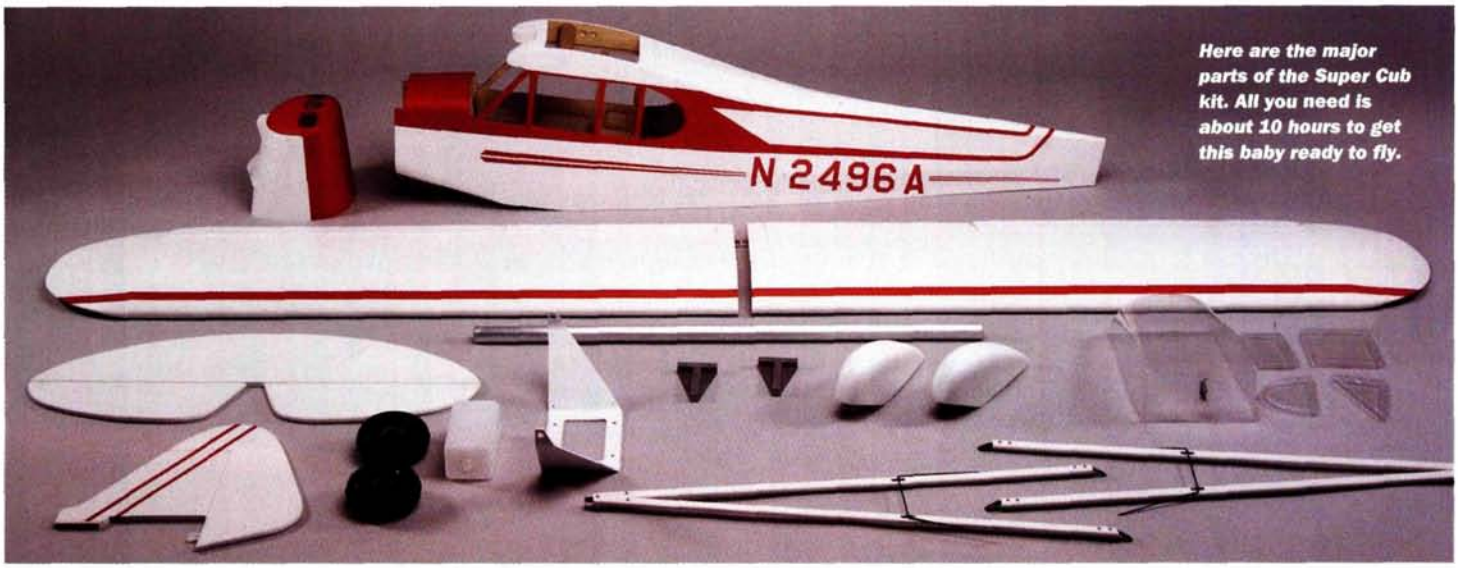
- Attachment of dummy spreader struts to the main gear could be better (see text).
- Skylight is attached with screws—time-consuming to remove and replace.

PHOTOS BY DERON NEBLITT

CUB ARF

by Gerry Yarrish

Super Cub! What a perfect name. The ever popular Super Cub is just that: a Piper Cub with super abilities. Contrary to popular belief, the Piper PA-18 Super Cub isn't just a standard J-3 Cub with a bigger engine in its nose; it is the end result of countless improvements and design changes that led to its becoming one of the best bush planes ever produced. With more than 50 years of refinement under its belt, it isn't any wonder that this versatile high-wing cabin aircraft is beloved by so many pilots. From the mountainous terrain of the rugged Alaskan frontier to the desolate destinations of the Australian outback, the Super Cub is a welcome sight for thousands of people living on the edges of civilization. Whether you call it a flying dogsled, a tundra taxi, or a pickup truck with wings, the Super Cub is an important lifeline that transports the supplies, tools and cargo so important to wilderness life. With floats, skis, or giant tundra tires attached—and weather permitting—the Super Cub can go just about anywhere!



Here are the major parts of the Super Cub kit. All you need is about 10 hours to get this baby ready to fly.

THE KIT

Hangar 9's new ARF is an excellent representation of the famous Super Cub. It has rugged, lightweight construction and hardware, and with its effective wing flaps and a new Zenoah G-26 under the engine cowl, the model has fabulous short-field takeoff-and-landing capabilities. The kit comes with everything plastic-wrapped and nicely packed. When I opened the box, I found nothing damaged or missing. The well-illustrated construction manual offers detailed photos and easy-to-understand instructions, and all the hardware is bagged for specific use. It took less than 10 hours for me to completely assemble the test model.

ASSEMBLY

Start construction with the wings. The instructions recommend that you first install all the control surfaces and then the servos and control linkages. I found it a bit easier to install the servos and long wire leads and then dry-fit the flaps and the ailerons into place. I then assembled the pushrods and attached them to the control horns. Once I found the proper locations for the control horns, I removed the control surfaces and attached the horns. Working with the separate control surfaces on the workbench is a lot easier than having to move the entire wing structure. When the horns were attached, I reinstalled the flaps and ailerons, and then I glued their hinges into the wing.

A large-diameter-aluminum carry-thru tube that fits into a cardboard socket tube at the top of the cabin area supports the wing panels. Nylon attachment bolts hold the wing panels against the sides of the cabin, and the ¼-20 blind nuts for the bolts are already installed in the wing root ribs. The aileron and flap servo leads pass through holes in the top of the cabin. The factory-built lift struts are bolted into place in the bottom of the wing panels. The blind nuts for the bolts have been installed at the factory; all you have to do is cut a hole in the covering with a hobby knife to expose the bolt holes. The attachment tabs at the ends of the struts have slotted holes to offer a bit of adjustment when you position the struts between the wings and the landing gear. Instead of being attached to the bottom of the fuselage, the bottom ends of the struts are bolted to the aluminum landing gear. This strengthens the attachment point and eliminates a weak spot in the wooden fuselage structure.

To make it easier to work on the fuselage, I attached both the main gear and the tailwheel before I worked on the rest of the structure. The kit comes with a rudder-attached tailwheel gear wire and attachment bracket, but for a more scale-like appearance, I installed a Klett molded-plastic assembly.

FLIGHT PERFORMANCE

Powered by the new Zenoah G-26 gas engine, the Super Cub is an awesome short-field performer! I used a 40:1 fuel/oil mixture and a Zinger 18x8 prop. The G-26 has a choke and is very easy to start. Close the choke, flip the prop until the engine barks, then open the choke and set the throttle to a little more than ¼. The engine usually fires up on the third or fourth blade! If it doesn't, just repeat the starting procedure.

TAKEOFF AND LANDING

When taxiing to the takeoff point, keep full up-elevator so you can maintain positive tailwheel steering. With the big, 100-inch wingspan, it's also a good idea to push the aileron stick into the wind; that is, to raise the upwind aileron to help keep the wings level in the crosswind. As soon as you push the throttle open, release the up-elevator and let the tail rise by itself while you control the heading with rudder. The model is very light on its feet, and in less than 30 feet (without flaps), the Super Cub will break ground just as you hit full throttle! With the balance point at 5 inches from the wing's leading edge, the model has a solid and brisk climb-out.

Just as you hit the end of the runway, you can start to make a turn away from the pits. After that, you can throttle back to about ½ and trim the elevator for straight and level flight.

My first few landing approaches were done without flaps, and I consistently overshot the runway; the model would just float on by. I pulled the throttle trim down to just above idle and went further downwind before turning base and final. This time, I carried about ⅛ throttle until I crossed the threshold and then went to idle. The model settled nicely and touched down about ¼ way on the runway. A touch of down-elevator kept the model on the ground, and it came to a stop with several yards of runway left.

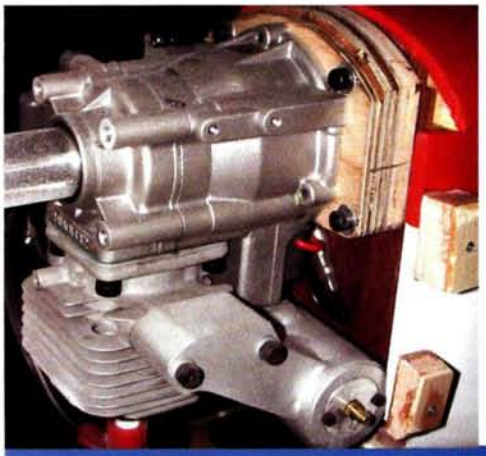
The tail surfaces come built and covered and are easily attached to the fuselage. Simply remove the covering where the surfaces are to be glued to the fuselage slot, and use 20-minute epoxy so you can adjust their alignment before the glue cures. As with the flaps and ailerons, I attached the rudder and elevator control horns before securing them to the fixed surfaces. The slots for the rudder and elevator pushrods are already cut out; just cut away the covering to open them.

Install the servos before you make the rudder and elevator pushrods. The pushrod assemblies are made out of 3/8-inch-square spruce and have threaded-metal pushrod wires and metal clevises at both ends. After I attached the wire ends to the spruce pushrods, I wrapped thick packaging string around them and used thin CA to reinforce the wire-attachment points.

Instructions for engine installation cover both gasoline and glow-powered engines. The kit comes with plywood spacers to set the gas engine at the proper distance from the firewall; when installed, it should be 6½ inches between the prop hub face and the firewall. Engine offset is already built into the firewall, so be sure to offset your engine's vertical centerline ⅛ inch to the left so the prop shaft will be centered when you install the engine cowl. A plywood shelf is provided for the included 16-ounce fuel tank, which I secured with PFM adhesive. The provided fuel-tank plumbing is compatible with both glow fuel and gasoline, so you won't have to buy a new tank stopper.

Because of the G-26's wide footprint, you must drill the fuel-line holes in both sides of the fuselage face. I found it helpful to slide the fuel lines into the holes and pull them into the fuselage before I connected them to the fuel-tank vent and outlet tubes. This way, you can position the tank and remove the slack by pulling the lines back out. Instead of using a 3-line fuel system, I simplified the installation by adding a T-fitting to the engine fuel-supply line. I attached it to a Slimline F-1 Fueler fitting that I installed in front of the windshield.

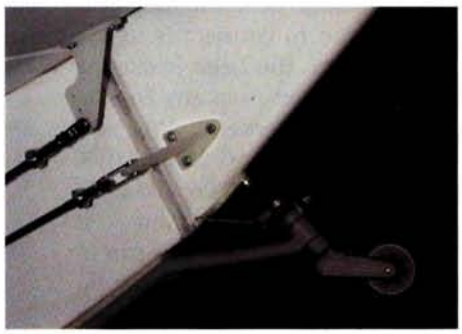
The throttle linkage is easy to install, and if you use a G-23 with a stock carburetor block, you can add a plywood standoff to the front of the fuselage side to support a 90-degree bellcrank. Connect the carb to the bellcrank with a pair of 4-40 ball-link connectors and a suitable length of threaded rod. The G-26 comes with a special carb block that rearranges the carb so you won't need a bellcrank to attach the throttle



If you power your model with a G-23 or G-26 gas engine, you will have to add some plywood-extension blocks to place the engine in the correct position. I used a Slimline G-23 Pitts-style muffler. It fits the G-26 but requires light filing to prevent its main canister from touching the engine case.

The servos are easy to install. I added strips of plywood under the servo mount tabs to increase the amount of material the attachment screws "bite" into. Note the 1800mAh battery pack strapped to the rear cabin shelf. I placed it there to help counter the weight of the engine.

The aileron servos are just in front of the control surfaces. The pushrod linkage for all the controls comes with the kit. Note the lift-strut attachment tabs that are slotted for adjustment.



I used a Klett molded-plastic tailwheel assembly. The wheel tiller is attached to the rudder with small springs.

LANDING WITH FLAPS

For a short-field landing, pull in the first half of flaps on the downwind leg and then pop full flap as you enter final. Keep the throttle at about ¼, and trim the model for a nose-down descent. The flaps keep the airspeed down, and the model sinks nicely all the way to the runway. As soon as you are over the end of the runway, chop the throttle, and flare the model for a wheel landing. I have found that if you try a 3-point landing with full flaps, the Super Cub will float down the runway before it touches down. If you can manage it, raising the flaps after touchdown might arrest the float, but I wasn't coordinated enough to find the right switch!

GENERAL FLIGHT CHARACTERISTICS

If you have flown a lightly loaded Cub before, you will find that the Super Cub is not a floater! With the powerful G-26 in the nose and minimal dihedral in the wing, the Super Cub is a great performer. The model climbs with great authority, and the relatively higher wing loading allows it to better penetrate the wind. It maintains airspeed and carries a surprising amount of momentum through all of its maneuvers. Control response is positive without feeling sensitive, and the model is moderately stable in all axes. Basically, while under power, it goes up in a hurry and with the power pulled back, it also comes down in a hurry!

AEROBATICS

Everything that makes the Super Cub less of a J-3 makes it more aerobatic. The abundance of thrust produced by the G-26 gives excellent rudder and elevator response, and you can rely on that thrust to extend your maneuvers much further than you would with a lighter Cub. Loops are big and impressive, and you can do one after the other over and over again. Rolls are slow because of the long wing, so if you want to do aerobatics, you should switch to high rates, at least on the ailerons. Kicking in some rudder will quicken the roll rate. If you want to really wind the model up, try a snap roll! You may have to move the balance point back a bit, but the Super Cub will do a nice snap roll. In a spin, the Cub will again wind up nicely if you truly stall the wing and enter the spin at full idle. The model stops spinning in about 1/2 rotation after you neutralize the controls, and it levels off nicely with power and a little bit of up-elevator.

If you can't already tell, I love the way the Super Cub flies. I also love the way the Zenoah G-26 powers the model. Together, these two are a match made in heaven!

ZENOAH G-26

Zenoah's new G-26 is much more than just a bored-out G-23. It offers a big 800rpm increase over the G-23 and produces about 25 percent more horsepower! Best of all, it weighs only about 2 ounces more. External mounting dimensions are almost identical; the G-26 will fit easily anywhere the G-23 does. Even the engine-mount bolt pattern is the same, so it is a simple, drop-in engine change! The larger carb is now equipped with a choke, so starting it is a breeze.

FEATURES

Increased transfer porting.
Bigger carb.
Easy starting.
Large-volume muffler included.

SPECIFICATIONS

DISPLACEMENT: 25.4 cc (1.6ci)
BORE: 34mm
STROKE: 28mm
PROP: 16x8 to 18x8
RPM: 8,900
FUEL: gas/oil mix
WEIGHT: 53 oz.

pushrod. However you attach the throttle linkage, be sure to use a plastic pushrod to connect it to the throttle servo. This helps isolate the radio equipment from any engine-generated interference.

I used a Slimline G-23 Pitts-style muffler to quiet the G-26, and it fits nicely after just a bit of filing so it doesn't rub against the lower part of the engine case. By the time you read this, Slimline will have a new muffler for the G-26, so this modification won't be necessary. Some of the lower fuselage front section needs to be removed to clear the muffler canister.

Once the engine and muffler have been installed, you can trim the engine cowl to fit. I made cardboard patterns for the carb and spark-plug boot locations and marked the openings with a Sharpie pen. It takes a few tries to get everything to fit right, so work slowly and remove a little bit at a time until your cowl fits and can be removed without too much effort. To complete the firewall-forward package, I installed an aluminum Tru-Turn spinner and a Zinger 18x8 wooden prop. I painted my prop white with orange tips and spruced it up a bit with some Model Graphics propeller decals!

The vacuum-formed cabin windows must be trimmed a little before you glue them into place; I used Pacer canopy adhesive to glue the windows and windshield. The skylight at the top of the cabin is the only thing I did not like very much. It requires eight small screws to attach it, and you must remove the clear plastic skylight every time you attach or remove the wing panels. Several times, I lost some of the small screws in the grass at the flying field. I plan to make a skylight with a plywood frame to form a hatch cover and use a hinge and a latch pin to secure it in place.

To dress up your Super Cub, the kit comes with nice fiberglass wheel pants and dummy landing-gear spreader struts. I did not use the wheel pants because when I test-flew the model (early in March), my flying field was a little on the rough side. The snow had recently melted, and the grass was uneven and clumpy. I plan to install the pants as flying weather improves. After about three or four landings, the dummy spreader struts came off. The instructions show how to install them by slipping the strut wires' bent ends into the small metal tabs that are screwed to the landing gear. I even used some glue to help the wire ends stay in the tabs, but they kept popping off. I plan to cut the ends off the strut wires and solder some metal clevises to them so I can clip them securely to the tabs.

I have had a ball flying the Zenoah G-26-powered Super Cub; with its wing flaps, it really is a great short-field flyer. If you've ever wanted to feel like an outback bush pilot, this is the combination to try.

The Zenoah G-26 is a great new engine. Almost identical to the G-23, it has almost 25 percent more power and easily turns an 18x8 prop at about 8,000rpm! (Photo shows stock muffler.)

Hangar 9; *distributed by Horizon Hobby.*

Horizon Hobby Inc. *(800) 338-4639; horizonhobby.com.*

JR; *distributed by Horizon Hobby.*

Model Graphics (now Cajun R/C Specialties) *(337) 269-5177; cajunrc.com.*

Pacer Technology *(800) 538-3091; pacertechnology.com.*

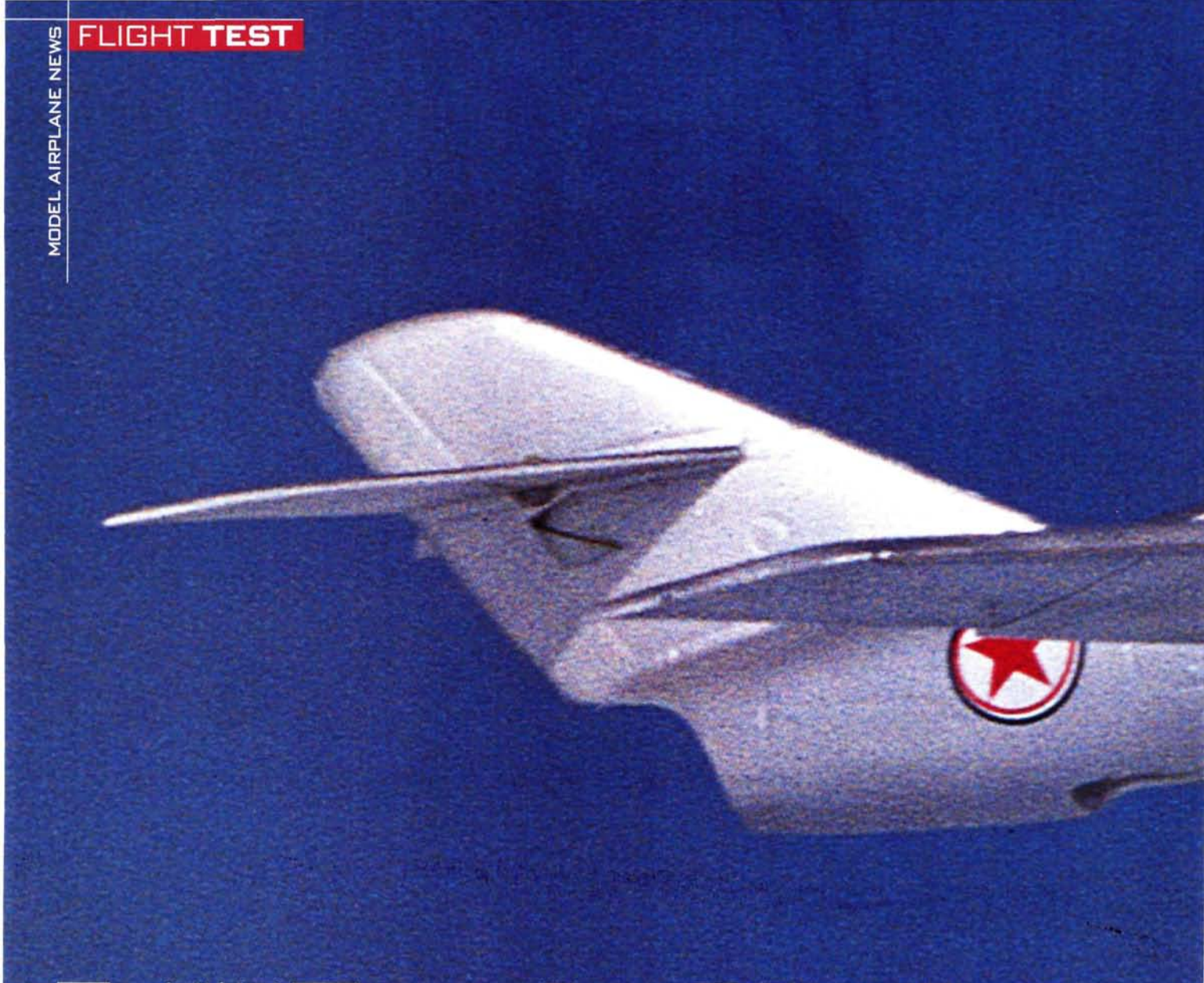
PFM, *distributed by Hobby Lobby Intl. (615) 373-1444; hobby-lobby.com.*

Slimline Mfg. *(480) 967-5053; slimlineproducts.com.*

Tru-Turn; *distributed by Romco Mfg. (713) 943-1867; tru-turn.com.*

Zenoah, *distributed by Horizon Hobby.*

Zinger; *distributed by J&Z Products (310) 539-2313; zingerpropeller.com.*



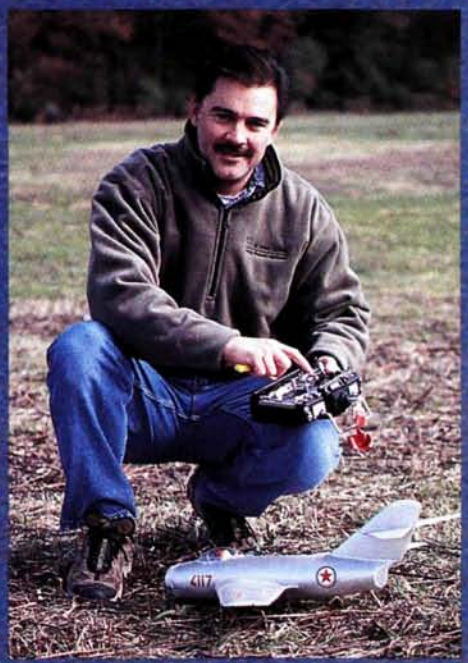
by Rich Loud

Fan-Tastic Models MiG 15

Backyard sorties with a park-flyer jet!

It's 0700, and there is an eerie calm to the crisp morning air. The mission: protect the North Korean front from UN forces. There, just below the horizon, a lone F-86 Sabrejet is on patrol. The Russian VK-1 engine roars as it pushes your MiG 15 along at a 670mph top speed in pursuit of the enemy. The MiG flies only a few feet off the ground and banks around the treetops to avoid detection. Then a familiar voice crackles over the radio and lets you know you're about to be late for work, so you reluctantly ease off the throttle and settle the tiny MiG for a perfect belly landing on the lawn at your feet.

This scenario—and others like it—will undoubtedly be played out many times over by modelers who build the Fan-Tastic Models MiG 15 ducted-fan park flyer. Designed around the GWS EDF-50 electric ducted-fan unit, the Fan-Tastic MiG and F-86 Sabrejet allow modelers to fly a jet just about anywhere.



SPECIFICATIONS

MODEL: MiG 15

TYPE: electric ducted-fan park flyer

MANUFACTURER: Fan-Tastic Models

WINGSPAN: 25.5 in.

WING AREA: 110 sq. in.

READY-TO-FLY WEIGHT: 7.25 oz.

WING LOADING: 9.5 oz./sq. ft.

LENGTH: 22.5 in.

DRIVE SYSTEM USED: GWS EDF-50 w/GWS GS100 5A speed control and 7-cell, 150mAh Ni-Cd battery

RADIO REQ'D: 3-channel (aileron, elevator, speed control)

RADIO USED: Futaba 8UAF w/GWS R4P receiver and Hitec HS-55 microservos

PRICE: $70

FEATURES: foam construction; vacuum-formed plastic parts, including cockpit detail and clear canopy; photo-illustrated instructions; clearly marked cutout lines on fuselage parts.

COMMENTS: this is a well-molded kit that comes with all needed hardware. The MiG is an excellent choice for intermediate builders and pilots who are looking for a scale electric ducted-fan jet that can be flown just about anywhere.

HITS

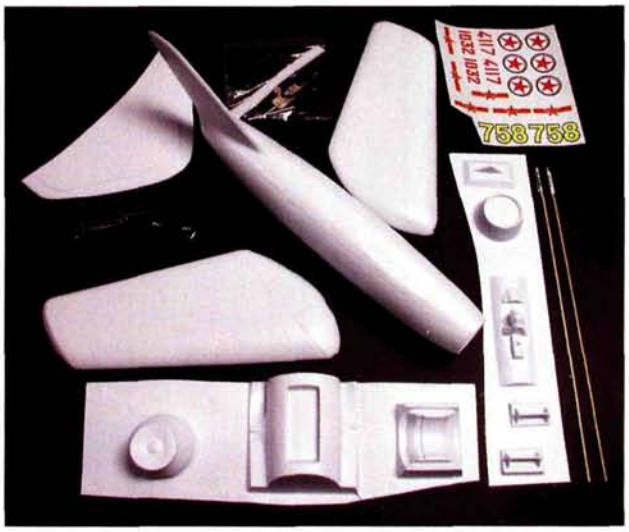
- Highly detailed molded-foam parts.
- Clear and understandable instructions.
- Beautiful scale appearance.

MISSES

- Nose-intake structure is easily crushed on hard landings.

JET UPGRADE

Early versions of the Fan-Tastic MiG 15 and F-86 Sabrejet had the fan unit mounted on the center of the fuselage and used pull/pull wires for elevator control. Locating the fan at the rear of the fuselage significantly improved performance, and now all kits go out with instructions and hardware as described in this review. If you have an early production kit, you can download current instructions from the Fan-Tastic Models website (fan-tasticmodels.com), and with a little modification, the parts from the original kit will work fine.



The kit contains everything you need except for the fan unit, radio gear and, of course, glue and paint. I was impressed with the detail in the molded-foam parts—especially the fuselage, which comes with the halves joined at the factory.

GETTING STARTED

Inside the box, you'll find nicely molded foam wings, stabilizer and fuselage. The fuselage is a thing of beauty in how it is molded and put together; I spent about 15 minutes looking it over to figure out how it was made. There are also many vacuum-formed plastic pieces, including the fan shroud, a cockpit with a pilot figure and a clear canopy. All of the small hardware pieces are packaged in a plastic bag, and the decal sheet is extensive enough to complete three models.

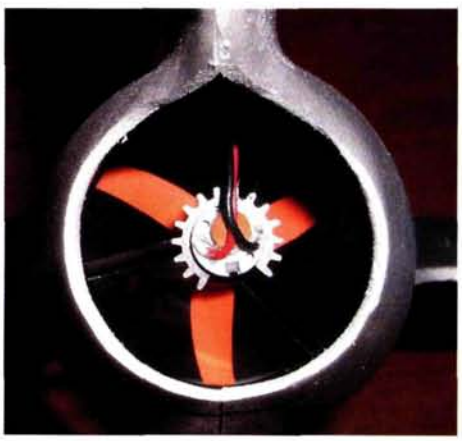
Don't mistake this kit for an ARF just because it is foam; truth be told, a fair bit of work is involved. The photo-illustrated instructions do a good job of guiding you through the construction, and builders who have a few kits under their belts shouldn't have any problems.

Building the wings is simple and straightforward. The main tasks are to remove the excess foam from the edges and to cut the ailerons free. Lines molded into the foam help with both of these tasks. Add the wooden leading-edge dowel, and wing construction is complete.

The stabilizer assembly is a little more complex in that it consists of two stabilizer halves, a joiner tube, a laser-cut plywood control horn and washers. You need to assemble all of the parts and glue them so that the stabilizer is flat and the control horn is canted slightly for proper operation inside the fin.

A quick inspection of the fuselage shows that all of the lines for the necessary cutouts are either molded in or clearly drawn on at the factory. The lines are also very clearly marked in the instructions. The first step is to mount the wings. I found that I had a minor but noticeable gap at the joint between the root and fuselage on both wings. Considering the flight loads the MiG is likely to encounter, I'm sure there was enough contact area for a solid glue joint, but I filled the gap with a light mixture of epoxy and microballoons just to make it look nice.

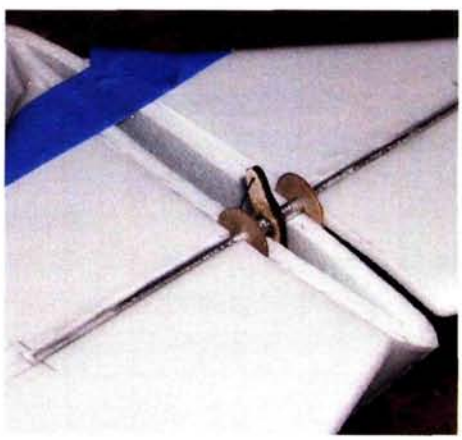
For the most part, the other work on the fuselage is just cutting the cheater hole and the access opening in the belly, cutting holes for aileron control wires and trimming the various vacuum-formed plastic pieces.



Above: looking up the business end of the MiG, you see that the fan is right there. This rearward location provides unimpeded airflow and top performance from the model. Notice how the motor leads are run up into the hollow fin and out of the airstream as quickly as possible.

RADIO AND MOTOR INSTALLATION

Two vacuum-formed servo mounts are included with the kit along with laser-cut plywood reinforcing pieces. The plywood is glued inside the plastic mounts to provide both stiffness and hard points for the servo-mounting screws. I trimmed the plastic piece to fit my Hitec HS-55 microservos and then glued each assembly to the inside of the fuse-



Right: once the stabilizer is set and confirmed straight and level, affix the two plywood bearings with a dab of epoxy, being careful to glue only the bearings to the fin while allowing the stabilizer to rotate freely. Use masking tape to hold the assembly in place while the epoxy cures.

MiG-15 Cold War Adversary

by Budd Davisson

The Yalu River runs wide and dark across the huge peninsula that is Korea. On either side, the topography is the same and at 40,000 feet, the hard blue sky doesn't change color just because the politics below are different. One morning in 1950, however, when American and ROK (Republic of Korea) pilots came back with wild tales of a sweptwing enemy fighter that slashed through them like a scythe through wheat, it was obvious something was indeed different on the other side of the Yalu. The North Koreans, whom it was assumed would be flying castoff WW II aircraft, had suddenly changed the rules of war. The MiG-15 had upped the ante considerably.

It could easily be said that aerial combat in Korea was not U.N. pilots versus Chinese and North Koreans, but Germans versus Germans—the leading aircraft on both sides were heavily influenced by WW II German technology, and both sides had German designers working for them. It is a fact that both the F-86 Sabrejet and the MiG-15 would have been much slower, straight wing airplanes had it not been for German sweptwing technology.

Regardless of what they were designing, the Russians have always been pragmatic in the extreme, so, the MiG-15 was crude where it could afford to be crude and amazingly efficient where it needed to be. Part of the 1946 specifications laid down by the Russian government said the airplane had to be capable of over 630mph at 45,000 feet and have a pressurized cockpit. At the same time, however, it had to be able to operate off of grass runways in all weather conditions. WW II had taught the Russians that their wars required fighting when and where it was necessary and, in those conditions, sophistication is the enemy of reliability—Russian equipment has always been nothing if not reliable.

It is axiomatic that "simple" always works and, when you're sitting in a MiG, you're struck by the simplistic spigots, valves and plumbing that snake everywhere throughout the cockpit. It looks like a WW I submarine. At the same time, the compactness of the cockpit reminds you that the MiG is a small airplane and behind you sits a big engine, one that was developed out of the Rolls Royce "Nene" engine right after WW II. Just ahead of your feet sits some very big guns, two 23mm and one 37mm cannon. Very small airplane, great big engine, great big guns. Hmmmm!

The combination of a little airframe perched on a big blow torch meant the MiG easily out-climbed the Sabre, it could sit at a higher altitude and pick its fights, and it was marginally faster. However, although its armament was hard-hitting, which was ideal for pounding bombers or tanks, it was, of necessity, slow firing. With the bullets spread so far apart, the probability of a hit during the deadly dance of dog-fighting, was much lower than with the fast firing, though shorter ranged, six .50 caliber Brownings of the Sabre. Still, it often took only one hit to down a Sabre.

The airplane reportedly had stability problems at high speed, but once the dogfight had inevitably ground down to slower speeds, it could turn on a very small dime. For these reasons, Sabre pilots developed tactics to deal with the differences, including spacing Sabre flights out so when the pack of MiGs dropped down on the leading U.S. formation, later formations evened the odds.

The MiG-15 demonstrated Russia's amazing ability to combine rudimentary mechanical designs with aerodynamic creativity to forge a weapon of awesome capabilities.

[Editor's note: editor-in-chief of our sister publication *Flight Journal*, Budd Davisson has logged more than 6,000 hours in nearly 300 types of planes, including many WW II fighters.]

FLIGHT PERFORMANCE

Prior to the first flight, I wanted to get a feel for the stabilizer's neutral setting, so I tested it by running along holding the model and occasionally releasing my grip. This is easy to do since the MiG is so light. When I was satisfied with the settings, I launched the model with the motor off to see how well it would glide. It settled into a nice groove and landed smoothly on its belly.

All flight tests were performed with 7-cell, 150mAh Ni-Cd battery packs, which provided enough power for solid performance and flight times of from 2 to 2½ minutes.

TAKEOFF AND LANDING

Launching the MiG 15 takes nothing more than a gentle toss into the breeze. Be sure to launch it with the motor/fan at full power. The rapid application of power after a gliding launch can result in a torque roll to the left; this is also something to consider at other times during the flight when airspeed may be low. The MiG 15 glides very well with no bad habits, so landing is a simple matter of flying it down to the turf. I found that as the battery runs down late in the flight and the fan output drops off, the MiG transitions to more of a powered glide mode, signaling that it's time to land.

LOW-SPEED PERFORMANCE

The MiG 15 is a park flyer and excels at low speed; in fact, that's the only speed it really has! Power-off stalls break straight ahead. Full-power stalls break to the left and may result in a spin if you aren't careful. The best way I found to avoid the spin is to cut the power, put the nose down to resume flying speed, and then gently apply power to keep flying. As mentioned, be careful of applying power rapidly when airspeed is very slow. Thrust from the little GWS 50 doesn't build as quickly as it would with a propeller, but the fan packs enough torque to immediately roll the plane to the left if there isn't enough airflow over the wings to resist it.

The ailerons maintain authority all the way to a stall. The big surface of the full flying stabilizer means that you don't need much elevator throw for proper control.

HIGH-SPEED PERFORMANCE

This is really a misnomer for the Fan-Tastic MiG 15. High speed for the MiG is maybe a blistering 10mph, but for such a small plane flying in close, it looks like it's burning up the sky! In any case, at the high end of its speed range, the MiG exhibits crisp, solid control.

AEROBATICS

"High-speed" passes on the deck are the coolest thing in my book. With high rates on the ailerons, the MiG will roll, but it needs some help from the elevator during the inverted portion. Loops are possible with a preparatory dive and careful application of the elevator. If you pull back too fast, the model may snap out of the loop; if you don't pull back fast enough, the model just won't make it around. I've heard that an 8-cell battery perks up performance enough to make multiple loops and rolls a piece of cake, but I haven't tested this myself. Strafing targets on the ground is my favorite maneuver.

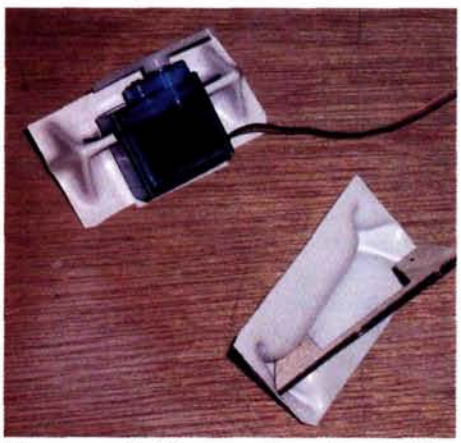
lage. There is a top and bottom to the plastic mount piece, so pay close attention to the photos for the correct orientation.

The MiG has a full flying stabilizer that's mounted near the center of the fin. To install it, you'll need to carefully cut off the top half of the fin. The fin is hollow, so it provides a neat interior pathway for the elevator pushrod. Use plywood washers to level the stabilizer in the fin, and then glue them in place. Now attach the elevator pushrod to the control horn and run it down into the fuselage before you reattach the top half of the fin.

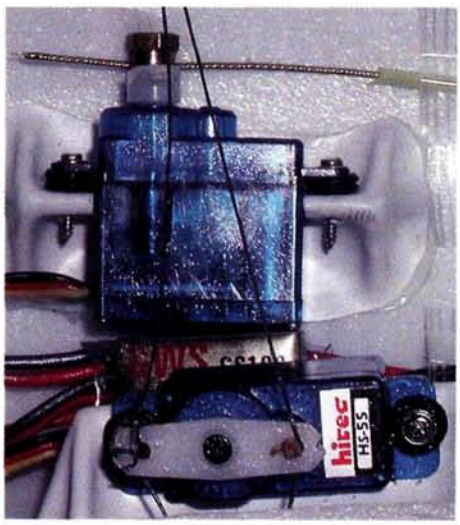
The next step is to insert the fan with the intake shroud attached through the belly opening and slide it as far toward the rear as you can. In its proper location, the fan housing will be about 1 inch away from the end of the tailpipe. Working through the cheater hole, tape the shroud into place. The fan installation is complete.

With the components mounted as shown in the instructions, all that remains is to determine the proper location of the battery pan so the MiG balances at the recommended CG. I mounted a 7-cell, 150mAh Ni-Cd battery in the pan and strapped the assembly into place to check the CG. Once I was satisfied, I marked the location and taped the battery pan and the belly cover into place. Then it was off to the paint booth.

Weighing in at a hair over 7 ounces and powered by a fan that produces about 2½ ounces of thrust, the Fan-Tastic Models MiG 15 is in some ways even more powerful than its full-size counterpart! It has the power to transport you 50 years back in time flying above the treetops of the Korean countryside. That is, of course, until that familiar voice crackles over the radio: "Dinner's ready!"



Above: mounting the servos is made easy with the vacuum-formed plastic mounts. Laser-cut plywood-reinforcing pieces add strength and hard points for mounting screws.



Right: the radio components are installed through a large opening in the belly. The aileron servo is mounted vertically and uses a pull/pull control, while the elevator servo is mounted horizontally and uses a conventional pushrod. The speed control is nestled between the two servos, and the receiver is mounted just to the front. The pushrod and wires are taped to the inside walls to keep the airflow path as smooth as possible.

Fan-Tastic Models *(817) 379-6468; fan-tasticmodels.com.*

Futaba Corp. of America; *distributed by Great Planes Model Distributors Co. (800) 637-7660; futaba-rc.com.*

GWS; *gws.com.tw; distributed by Balsa Products (732) 634-6131; balsapr.com; Horizon Hobby Inc. (800) 338-4639; horizonhobby.com; and Maxx Products Intl. (847) 438-2233; maxxprod.com.*

Hitec RCD Inc. *(858) 748-6948; hitecrcd.com.*

Inspired by the highly maneuverable, aerobatic R/C Nobler of the early '70s, the Top Flite Gold Edition 30th Anniversary R/C Nobler 40 kit retains all of the original's flight characteristics and can now take advantage of today's computer radio systems. The redesigned model, which has been engineered to allow the installation of up to seven servos as well as retractable landing gear and flaps, is much stronger and easier to build than the original.

by Jim Onorato

Top Flite R/C Nobler 40

Classic lines with modern performance

NAME: R/C Nobler 40

MANUFACTURER: Top Flite

DISTRIBUTOR: Great Planes Model Distributors

TYPE: .40-size sport aerobat

WINGSPAN: 51 in.

WING AREA: 550 sq. in.

WEIGHT: 5 lb., 9 oz.

WING LOADING: 23.3 oz./sq. ft.

LENGTH: 42 3/8 in.

RADIO REQ'D: 4- to 6-channel w/5 to 7 servos

RADIO USED: Futaba FP-T7UAF trans-mitter, 8-channel Platinum Hitec receiver, 6 S148 Futaba servos and 1 S136G Futaba retract servo

ENGINE RECOMMENDED: .25 to .46 2-stroke or .40 to .52 4-stroke

ENGINE USED: O.S. .46 FX 2-stroke

PROPELLER: 11x7 APC

FUEL USED: 10% Red Max

PRICE: $ 79.99

FEATURES: balsa and lite-ply construction; complete hardware package; can be built with retracts and flaps.

COMMENTS: the Nobler is a high-quality kit that builds easily, looks great and flies well. Sunday fliers should enjoy the versatility of its flight envelope— everything from a slow crawl with flaps down to exciting aerobatic maneuvers.

HITS

- High-quality materials.
- Excellent, step-by-step instruction manual.
- Substantial hardware package.
- Excellent flight performance.

MISSES

- None.

THE KIT

The Nobler kit features balsa and lite-ply construction with basswood wing spars and an ABS plastic cowl. Other items included are a generous hardware package, hinges, an adjustable engine mount, preformed wire landing gear, self-stick decals, a vacuum-formed canopy, two sheets of rolled CAD plans and an excellent, 52-page instruction manual. The manual includes instructions to install fixed and retractable landing gear as well as optional flaps. It also includes a reduced copy of the plans for ready reference—a nice touch!

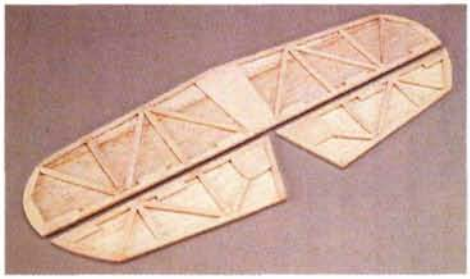
CONSTRUCTION

I used Great Planes' thin and medium Pro CAs and accelerator for most of the construction and 6- and 30-minute Pro Poxy on the firewall, wing-spar joiners, wing-bolt blocks and landing-gear rails.

• **Tail feathers.** I built the fin, rudder, stab and elevator directly over the plans using balsa sticks and die-cut balsa parts, and then I covered them with sheet balsa. The elevator is built in halves that are joined with a wire joiner and operated with a single servo. CA-type hinges are provided, but I did not install them until I had covered the model.

• **Fuselage.** The fuselage is constructed mostly of die-cut balsa with lite-ply formers and doublers. The die-cutting of the balsa parts was excellent, but the die-cutting of the lite-ply parts was only fair. Top Flite uses computer-designed, interlocking parts that ensure a strong, straight fuselage, and since all the parts interlock, you do not have to build the fuselage over the plan. The location of the pushrod routing holes is indicated on all formers to take the guesswork out of pushrod routing. If, however, you intend to install flaps, you might find it better to position the elevator servo on the right side of the fuselage instead of the left to avoid interference with the flap servo. In this case, you should relocate the holes in the formers for the elevator pushrods.

The construction of the fuselage is straightforward. Basically, you build a slab-sided "box," and then add the round forward section and turtle deck. Make sure that you build a left and a right fuselage side and that the doublers are cut correctly so the firewall has built-in right thrust. After you've assembled the sides, formers, hold-down blocks, firewall and top deck, install the throttle, rudder and elevator servos and receiver. The radio installation can be as simple as five standard servos or as challenging as seven that must be installed in a confined space. If you pay attention to the instructions, you shouldn't have a problem. The area to watch is the clearance between the elevator and flap servos, since they are both on the left side of the airplane. Note that if you use full-size servos, you'll have to cut holes in the top deck and mount the servos as high as possible so they stick through the holes in the top deck. The same is true when mounting the receiver—if you use a large receiver.



Top: the tail feathers are built right over the plans and covered with sheet balsa. Middle: the fuselage is basically a "box" with a round forward section and turtle deck; it's a straightforward build. Bottom: the Nobler can accommodate from five to seven standard servos.

The upper part of the fuselage is built after the radio has been installed. The turtle deck and the top of the fuselage forward of the turtle deck are sheeted with balsa over lite-ply formers. I sprayed the outside of the balsa sheets with water and ammonia so they would not split when bent around the formers. The bottom sheeting is added after the wing has been mounted on the fuselage.

• **Wing.** The original R/C Nobler had a fixed wing that was permanently attached to the fuselage, so it was a bit difficult to transport and store it. The new R/C Nobler has a removable wing held in place with three nylon bolts. It has a constant chord and a fully symmetrical airfoil. Each wing half has a one-piece balsa, notched spar web onto which die-cut balsa ribs are positioned, followed by two basswood spars and a die-cut balsa trailing-edge web/jig. I assembled the entire right wing half over the plan and then glued the parts with thin CA. The 1/16-inch-thick ribs are quite thin, so be careful when you handle them, and also note that the type of doubler used and the cutouts you make in the ribs will depend on whether you are going to install retracts or fixed landing gear. I had decided to install retracts and flaps, so I followed the steps indicated for that version. I glued on the leading and trailing edges and the leading-edge sheeting, and then I removed the wing from the plan, turned it over and completed the bottom of the wing. This included the retract rails, the aileron-servo hatch, the leading- and trailing-edge sheeting and the capstrips. When this was complete, I added the trailing-edge sheeting and capstrips to the top of the wing. With the right wing panel complete, I proceeded to repeat the procedure for the left panel.

The Nobler has built-up wingtips made out of a die-cut core and die-cut tip ribs. I built the wingtips and set them aside for final assembly. Next, I built the ailerons and functional flaps over the plan with balsa sticks and then sheeted their tops and bottoms. Each aileron has its own servo mounted on an aileron-servo hatch, and the flaps are joined with a wire joiner and operated from a single servo.

I epoxied the wing panels together with 30-minute epoxy using the provided 1/16-inch-ply spar joiners. I placed the wing upside-down on the building board during this step to give it a small amount of dihedral. After the epoxy had cured, I sheeted the center of the wing and installed the flap servo, being very careful to follow the instructions to avoid interfering

FLIGHT PERFORMANCE

The instructions provide recommendations for high- and low-rate control throws. I set up the throws according to those recommendations and used the low rates for initial flights. All of my flying has been from a grass runway.

TAKEOFF AND LANDING

The main wheels on the Nobler are not very far forward, so you have to be mindful of potential nose-overs—especially on grass runways. As with all tail-draggers, on takeoff, I apply some up-elevator to keep the tail down and then gradually advance the throttle. As the model gains speed, I decrease the up-elevator to allow the tail to come up off the ground; then, when flying speed is attained, I apply just a touch of up-elevator to get it airborne. Depending on the size of engine you install, you may have to apply some right rudder to counteract engine torque during the takeoff run.

The Nobler has a very shallow glide ratio that, together with its light wing loading, make for easy landings. With the flaps deployed, it slows to a crawl, and a slight flare just before touchdown is all that is needed for beautiful 3-point landings.

LOW-SPEED PERFORMANCE

One of the things I like most about the Nobler is its ability to fly slowly without losing stability. It has a very low stall speed, and its stalls are gentle and straight ahead. I attribute this to its constant-chord wing and light wing loading.

HIGH-SPEED PERFORMANCE

With the O.S. .46 FX at full throttle and wheels up, the Nobler really moves. Keep in mind that this is a very aerobatic airplane that doesn't have the self-righting characteristics of a trainer. You shouldn't experience any bad tendencies at top speed, but you have to keep "on the sticks" at all times.

AEROBATICS

The Nobler handles most aerobatic maneuvers with ease. The roll rate is pretty good with the low rate settings and incredibly fast at high rate! By coupling the flaps with the elevator, you can really tighten up the loops. The Nobler also tumbles with ease and does extremely fast snap rolls. I'm still finding new things to do with this very nimble flyer.

with the elevator servo when the wing was attached to the fuselage.

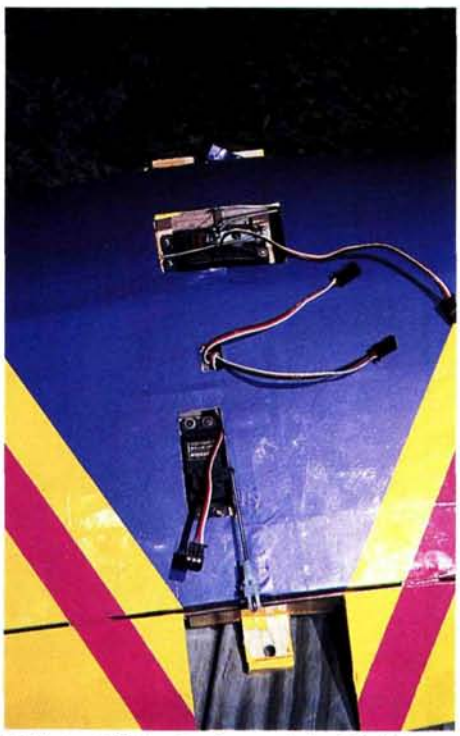
I temporarily positioned the wing on the fuselage with a piece of wax paper between them so I wouldn't accidentally glue the two together, and I built the belly pan directly on the wing. Then I attached three wing hold-down blocks and drilled and tapped the blocks in the fuselage for three ¼–20 nylon bolts. After I had epoxied the tail feathers in place, I sheeted the bottom of the fuselage and added the wingtips. When it was time to install the fuel tank, I discovered that the recommended 10-ounce tank would not fit in the space provided, so I installed an 8-ounce tank instead.

I used a pair of Great Planes mechanical retracts and a Futaba S136G retract servo, and I installed both per the instructions.

POWER AND FINAL TOUCHES

Top Flite recommends a .20 to .46 2-stroke or .40 to .52 4-stroke for the Nobler. I chose an O.S. .46 FX 2-stroke and mounted it inverted on the Great Planes adjustable engine mount provided in the kit.

The Nobler comes with an ABS cowl that's molded in two pieces. I trimmed the halves, glued them together with thin CA and reinforced the seam with the provided fiberglass tape. I covered the plane with Metallic Plum and Cub Yellow MonoKote and used Pink MonoKote for the trim. I painted the cowl with Cub Yellow LustreKote and used the included self-stick decals for the graphics. I attached the canopy with R-56 canopy glue and then added an 11x7 APC prop and a 2½-inch aluminum Tru-Turn spinner.



A Futaba S136G retract servo is installed (at top), and the flaps are joined with a wire joiner and then operated from a single Futaba S148 servo (below).

The instructions indicate that the Nobler will probably be nose-heavy and, depending on the engine used, will require an ounce or more weight in the tail. I mounted the receiver battery behind the cockpit and did not have to add any weight to get the plane to balance properly.

CONCLUSION

The Top Flite Nobler is a high-quality kit that looks great on the ground and in the air. Its outstanding building instructions make building easy. It is highly aerobatic yet stable at low speed, and the flaps and retractable-gear options add to the fun and excitement of this classic airplane. If you are experienced at flying low-wing sport planes and are looking for a kit that's an enjoyable build, check out the Nobler. It's definitely a lot of fun to fly! ✈

APC Props; *distributed by Landing Products (530) 661-0399; apcprop.com.*

Futaba Corp. of America; *distributed by Great Planes; futaba-rc.com.*

Great Planes Model Distributors Co. *(800) 637-7660; greatplanes.com.*

Hitec RCD Inc. *(858) 748-6948; hitecrcd.com.*

LustreKote/MonoKote; *distributed by Great Planes.*

O.S.; *distributed by Great Planes; osengines.com.*

Red Max; *a division of FHS Supply, Inc. (800) 742-8484; members.aol.com/FHSoil/RedMax.html.*

Top Flite; *distributed by Great Planes; top-flite.com.*

Tru-Turn; *distributed by Romco Mfg. (713) 943-1867; tru-turn.com.*

SPECIFICATIONS

MODEL: Slope Scale P-39 Aircobra

MANUFACTURER: Cavazos Sailplane Design

TYPE: scale slope sailplane

WINGSPAN: 46 in.

WING AREA: 310 sq. in.

WEIGHT: 28 oz.

WING LOADING: 13 oz./sq. ft.

RADIO REQ'D: 2-channel (aileron, elevator)

RADIO USED: Hitec Eclipse-7 w/Hitec HS-225 servo for aileron and HS-85 servo for elevator; Hitec 555 micro receiver; Hitec 4-cell, 600mAh airborne pack

PRICE: $159.99

FEATURES: epoxy/glass fuselage with molded details; hot-wire-cut, pink-foam wings; balsa sheeting; hardware package; three 11x7 drawings and instructions.

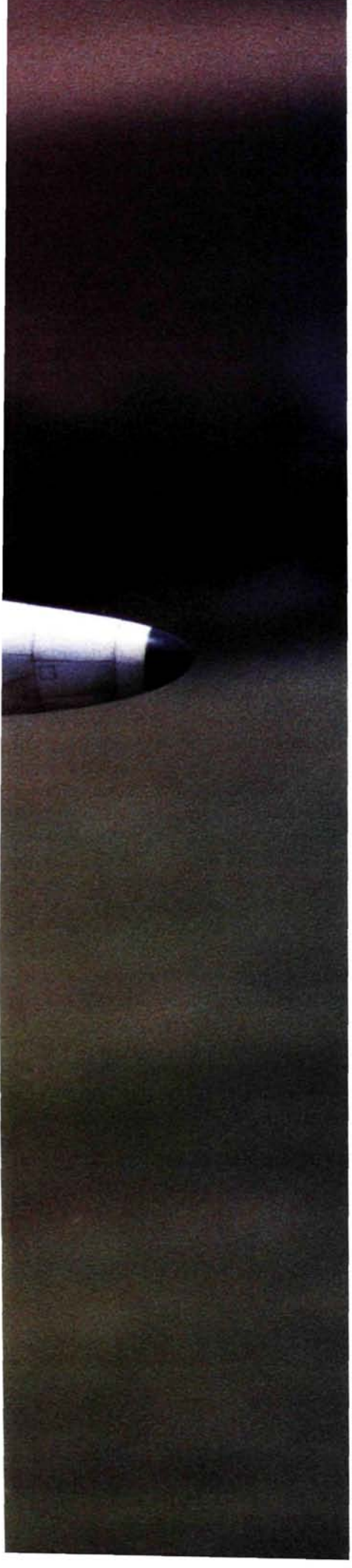
COMMENTS: the P-39 Aircobra is a high-performance sailplane that features an exquisitely molded fuselage with many scale details, and the kit uses advanced construction methods. On the slope, this plane rocks and rolls.

HITS

- Accurately molded fuselage with scale details.
- Complete hardware package.
- Great performance on the slope.

MISSES

- Instructions may seem brief to less-experienced builders.



Cavazos Sailplane Design P-39 Aircobra

High-performance scale sailplane

by Dave Garwood

A radical design for its day, the Bell P-39 Airacobra was designed around a weaponS system. The design started with an Oldsmobile 37mm cannon, which was fired through the propeller hub. To fit the cannon inside the nose, the engine was placed behind the cockpit; from there, it drove the propeller by means of a long shaft that ran under the pilot's seat. The Airacobra played a distinguished role in ground attack and close-air support for ground units as an early tank buster. It served with distinction in Russia, North Africa and the Pacific theater until more powerful fighters began to replace it in 1944.

Now you can own a replica of this seldom-modeled aircraft. Cavazos Sailplane Design recently acquired the Slope Scale line of high-performance, power-scale sailplanes (PSS) and upgraded it with improved fuselage molds, a new airfoil and advanced production methods.

KIT CONTENTS

First out of the box, the epoxy/glass fuselage is exquisitely molded and very scale looking. The molded detail now includes canopy rail markings, wing fillets and an engine air-intake scoop. To compress and strengthen the composite construction, the lapped-seam fuselage was manufactured with an inflatable bag inside the mold.

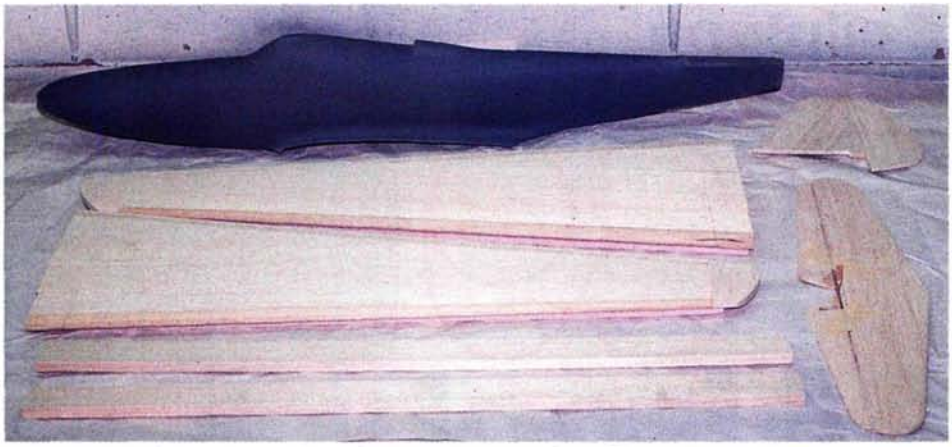
The kit includes hot-wire-cut, pink foam wing-cores sized to a new airfoil that preserves high-speed attributes and improves performance in light lift. Also included are precut balsa vertical and horizontal stabilizers, balsa wingtip blocks and sheet balsa for the wing; hard balsa leading-edge and balsa sub-trailing-edge stock; and hardware (including aileron torque rods, threaded aileron control wires, a snake-type elevator pushrod, elevator control horn, clevises and threaded wire parts).

Three 11x17-inch drawings and an eight-page instruction booklet are also included. Slope Scale planes are designed for experienced builders and fliers, and the instructions assume that the builder is familiar with foam-core wing sheeting and fiberglass finishing. If you've built foam-and-fiberglass planes before, you'll be pleased with the discussion of alternative building and finishing materials and flight setup tips. If you're new to this construction method, you may want to get some advice.

PHOTOS BY DAVE GARWOOD

CONSTRUCTION

Stage 1. Contemplation and planning: two hours. You'll decide either to permanently mount the wing on the fuselage or to build a removable wing. The permanent wing mount makes a stronger aircraft that's better able to resist damage during cartwheel landings, but it requires you to cut a hatch in the fuselage for radio access. The removable wing option produces a model that's easier to transport, is nearly as strong and requires you to make the wing-mounting parts but doesn't need a hatch. The removable-wing version will be slightly heavier because the servos are mounted farther back, and more nose weight will be needed to balance the plane. Each wing mount has its advantages, and light and heavy Slope Scale planes fly well in suitable lift conditions. I decided to go with the removable wing option.



Major construction steps completed: fuselage has been primed, filled, sanded and reprimed; wings have been sheeted with leading edges, and sub-trailing edges are attached; and ailerons and tail parts have been sanded.

The kit supplies a conventional wire-in-tube pushrod and a nylon control horn for elevator control, but it spoils the scale look of the tail; I prefer internal elevator-control horns on scale planes. You may also decide that you'd like the leading-edge material to be tougher than the hard balsa supplied in the kit, so that your plane will survive landings on unfriendly terrain.

In building my Aircobra with a removable wing, I installed an internal elevator control and used basswood leading edges. My list of additional materials included pieces of plywood; a threading tap; nylon bolts for the wing mount; wire and brass tube for the elevator horn; and 24-inch-long, ½x½-inch basswood sticks for the leading edge.

Stage 2. Building: 22.5 hours. Begin by sheeting the wings, add the leading- and trailing-edge sticks, trim them with a small plane, and shape them with long sanding blocks. While the glue is setting up on the wing parts, wet-sand the fuselage, let it dry, spray it with primer and fill the pinholes.

Shape and sand the tail parts. The kit supplies P-63F King Cobra vertical fin parts. I made a pattern for my P-39Q Airacobra tail by enlarging a drawing from the "P-39 Airacobra in Action" and by cutting new vertical stab parts out of 3/16-inch balsa sheet. If you've decided on an internal control linkage, build and install an elevator-control horn.

Trim and sand the wing halves, cut out the ailerons and then hinge them. Install the aileron torque rods and join the wing halves with epoxy, paying attention to the dihedral and wing-sweep angles. After a suitable cure time, wrap the wing center joint with fiberglass tape, and epoxy the joint. While the epoxy is curing, wet-sand the fuselage again.

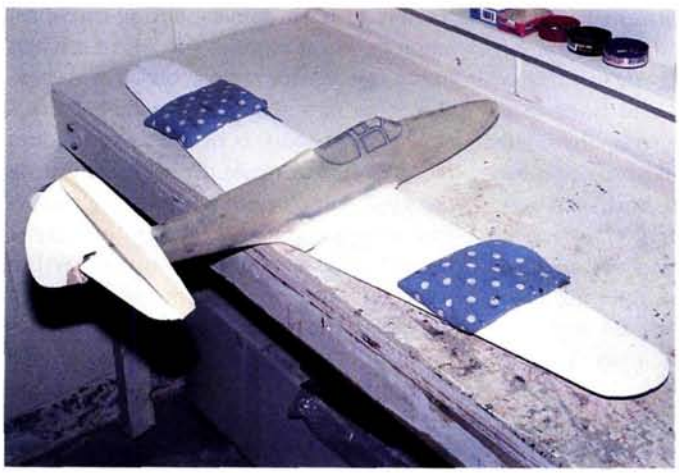
If you build a fixed-wing version, you'll need to cut an access hatch, following the instructions, so you'll be able to install both servos in the nose. For the removable-wing version, I installed the aileron servo in the wing and secured it to wooden mounting rails with screws. I installed the elevator servo inside the molded canopy with a blob of silicone glue. I connected the elevator-control horn to the servo with a ¼-inch-diameter birch dowel that had threaded rods epoxied into holes at each end. For an external elevator-control horn, follow the instructions to install the snake-type pushrod, threaded parts and molded control horn supplied in the kit.

For the fixed-wing version, be certain that your elevator-control linkage is installed and that the aileron-control links leading to the servo are in place before you glue on the wing. With the wing mounted on the fuselage, test-fit the horizontal stabilizer, paying close attention to the decalage angle. Add a shim under the horizontal stab, if necessary, to get the recommended zero-degree alignment right. This is important to the aircraft's flight performance.

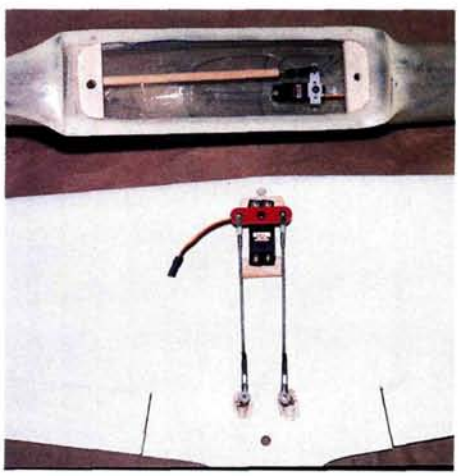
Install the elevator-control linkage, and mount the tail parts with epoxy. Fair in the rear of the fuselage to the fin with a mixture of epoxy and microballoons, and lay small bits of fiberglass cloth in the fairing to firmly attach the fin to the fuselage. When these have cured, sand them smooth.

Stage 3. Radio installation: two hours. In keeping with my light-but-tough building theme, I installed a Hitec HS-225 MG Mighty Mini servo for aileron control and a Hitec HS-85 BB Mighty Micro servo for elevator control. Each has a ball bearing on the output shaft, and the HS-225 has metal gears. My receiver is the trusty Hitec 555 micro. I've used 555s in five planes over the last few years, and I've had nary a problem with radio reception or receiver durability. Onboard electrical storage is from a Hitec 4N-600AACL, 4-cell, 600mAh pack (there's no advantage in installing a smaller battery pack because this plane needs nose weight to balance). Total weight for the onboard radio components is 5.5 ounces (with a shortened aileron-servo cable).

My transmitter is a Hitec Eclipse-7 computerized unit—decadent for an aileron-and-elevator slope plane, but I like to set the controls up with exponential, which is easy with this radio. When it's equipped with a Spectrum frequency module, all you'll need to change channels in the field is a new receiver crystal, as broadcast



Left: tail parts alignment: glue on the horizontal stab after the wing has been mounted, to make it easier to get them parallel. Set the vertical fin in place with epoxy, and hold it in position with tape.



Right: servo installation layout: elevator servo glued into the fuselage with Goop silicone adhesive and aileron servo installed in wing with screws set into plywood rails that were glued to the wing sheeting.

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channel numbers are selectable in the transmitter. Note that the plane requires only a 2-channel radio set to fly, as rudder control isn't recommended or needed.

COVERING, PAINT AND FINISHING

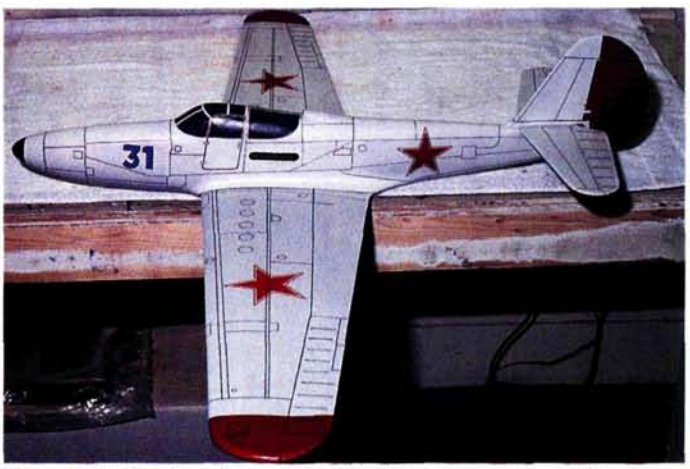
The Airacobra was flown by the United States, Britain, France and Russia, so you'll have a choice of stars and bars, roundels and red star markings. Some were made out of polished aluminum; many were painted in drab olive, and others, in mottled camouflage. I found a white scheme that makes my plane more visible than a camouflage finish. The scheme is based on VMF "Red 77" flown by Yuri Penakov with the Sixth Independent Fighter Eskadrilya on the Russian northern front during the winter of 1942-'43, as documented on the Kit Hobbyist website at kithobbyist.com/VVS/Markings/index.php.

My Aircobra is covered with Solartex iron-on fabric, and the control surfaces are hinged with Solartex. It took about four hours to cover the wing, stab and fin. The entire plane is spray-painted with three coats of primer, wet-sanded between coats. The final base coat was airbrushed with Testors Model Master enamel, as were the canopy markings, the rudder, spinner and tip markings. The red star markings are Major Decals sheet number 7010 water-slide decals. I applied panel lines with a Sanford Sharpie ultra-fine marker and an overall coat of Testors Dul-Cote lacquer.

With 2.5 ounces of nose weight, balanced at the factory-recommended 2½ inches behind the wing leading edge at the wing root, my finished model weighs 28 ounces and yields a wing loading of 13.8 ounces per square foot. Aileron throw was set to ½ inch up and ⅜ inch down, and elevator throw was rigged to ⅜ inch up and ½ inch down.

Completed airframe with final primer coat. Hey; it's looking like an Aircobra!

Aircobra in Russkie warpaint. Most markings are masked and painted, including the background for the engine exhaust stacks. Red stars are Major Decals water-slide decals.



Slope Scale Aircobra with an airbrush paint scheme and panel lines drawn with a fine-tip marker.

ON THE SLOPE

On a flying trip to the Midwest Slope Challenge, we spent six days at the Wilson Lake Reservoir. Two days after the event, there were steady 15 to 20mph winds blowing darn near straight into the south-facing 100-foot slope. Several pilots flew the Aircobra, and all reported that they were pleased with the way it handled. You need to keep it moving to get through light lifts, and when the lift is there, this plane rocks and rolls.

The new line of Slope Scale planes from Cavazos Sailplane Design flies as well as the originals and, thanks to the new molds, they look better than ever. ✈

Cavazos Sailplane Design (CSD) (909) 485-0674; rcglider.com.
Hitec RCD Inc. (858) 748-6948; hitecrcd.com.
Major Decals; distributed by Northeast Screen Graphics (413) 525-7465; majordecals.com.
Solartex; distributed by Global Hobby Distributors; (714) 963-0329; globalhobby.com.
Testors Corp. (815) 962-6654; testors.com.

click trip MODELAIRPLANENEWS.COM MAKE INTERNAL ELEVATOR-CONTROL HORNS

FLIGHT PERFORMANCE

TAKEOFF AND LANDING

In strong lift, Slope Scale planes launch best with a grip on the fuselage in front of the wing. Heave it hard and let it drop to gather speed, and soon it climbs rapidly and easily. This is an energy plane, not a floater, so keep it moving. This slippery warbird flew great; it had no trouble penetrating, and I could cover the sky at will.

GENERAL FLIGHT CHARACTERISTICS

In a 45-minute first flight, we found that straight and level flight was quick and true: this plane goes where you point it. Aileron and elevator inputs were responsive but not twitchy, and the plane does two 360-degree rolls per second at full aileron deflection.

AEROBATICS

Inverted flight is solid and requires only a little forward stick pressure to maintain its position. The Aircobra will pull through large loops but will snap out of tight loops if the pilot pulls too hard on the elevator. It's completely at home performing split-S and Cuban-8 maneuvers. It lives for stall turns. Yes; even without a rudder, the Aircobra turns and burns through "half-pipe" maneuvers.

A perfect blend of looks and performance

by Frank Gagliardi

With its great flight performance and distinctive looks, the Sig Four-Star 60 should be on every sport modeler's wish list! This almost-ready-to-fly (ARF) version of the classic Sig kit features expert, built-up construction, Oracover film covering in your choice of red or yellow and a complete hardware package that includes a large-capacity fuel tank, aluminum-alloy landing gear, wheels and tailwheel assembly and a Sig spinner. I was pleased to see that Sig includes standard 4-40 rods and links for the control surfaces—no guessing tool sizes! The parts are extremely well packaged, and I was pleasantly surprised by the wrinkle-free covering.

PHOTOS BY DAVE MARTIN & FRANK GAGLIARDI

Sig FOUR-STAR 60 ARF

SPECIFICATIONS

MODEL: Four-Star 60 ARF

MANUFACTURER: Sig Mfg. Co.

TYPE: intermediate aerobatic ARF

WINGSPAN: 71 in.

WING AREA: 920 sq. in.

WEIGHT: 7 to 8 lb.

WING LOADING: 18.78 oz./sq. ft @ 7.5 lb.

LENGTH: 57 in.

RADIO REQ'D: 4-channel with 5 standard servos

RADIO USED: Hitec Spectra 7 transmitter with 5 Futaba 148 servos

ENGINE REQ'D: .60 to .75 2-stroke or .65 to .90 4-stroke

ENGINE USED: O.S. .61 FX

PROP: APC 12x6

FUEL: Performance Plus 15%

PRICE: $199.99

FEATURES: balsa and lite-ply fuselage; built-up, two-piece wing; built-up rudder and elevators; sheeted fin and horizontal stab; airframe covered with heat-shrink Oracover film in your choice of red or yellow; Sig spinner; molded canopy; complete hardware package; Mylar decal sheet.

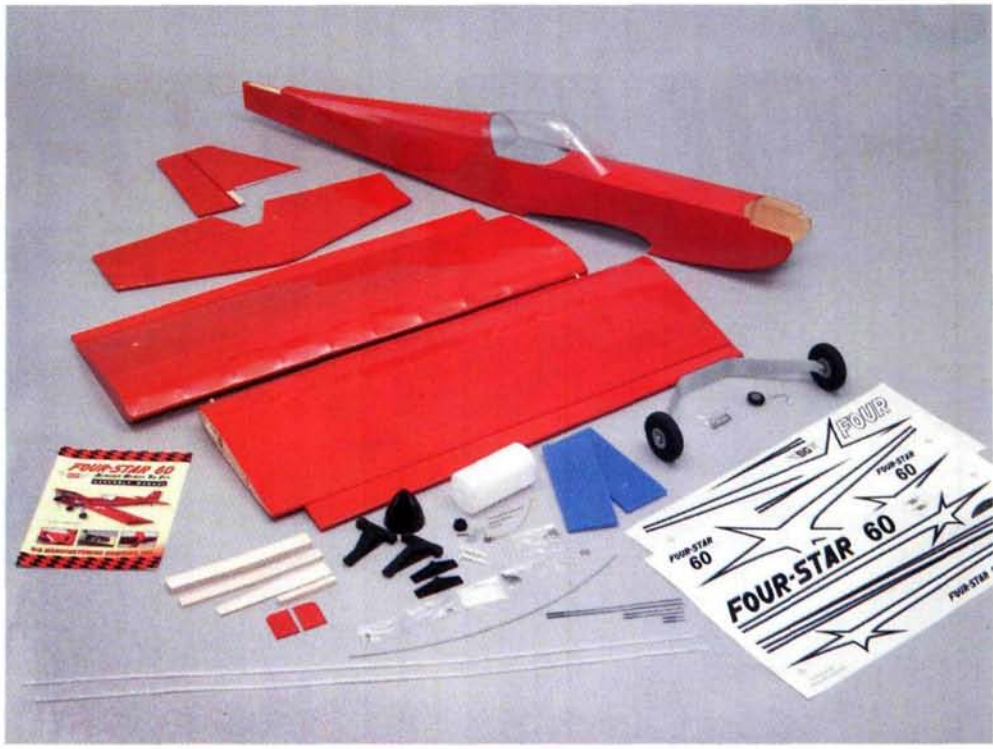
COMMENTS: the Four-Star 60 is well engineered, well executed and well presented. Its light wing loading makes this airplane a joy to fly and will give the new pilot a sense of solid control through the aerobatic learning curve. The old dogs among us may even learn a few new tricks with this very forgiving airplane.

HITS

- Nicely built.
- Excellent flight performance.

MISSES

- None.



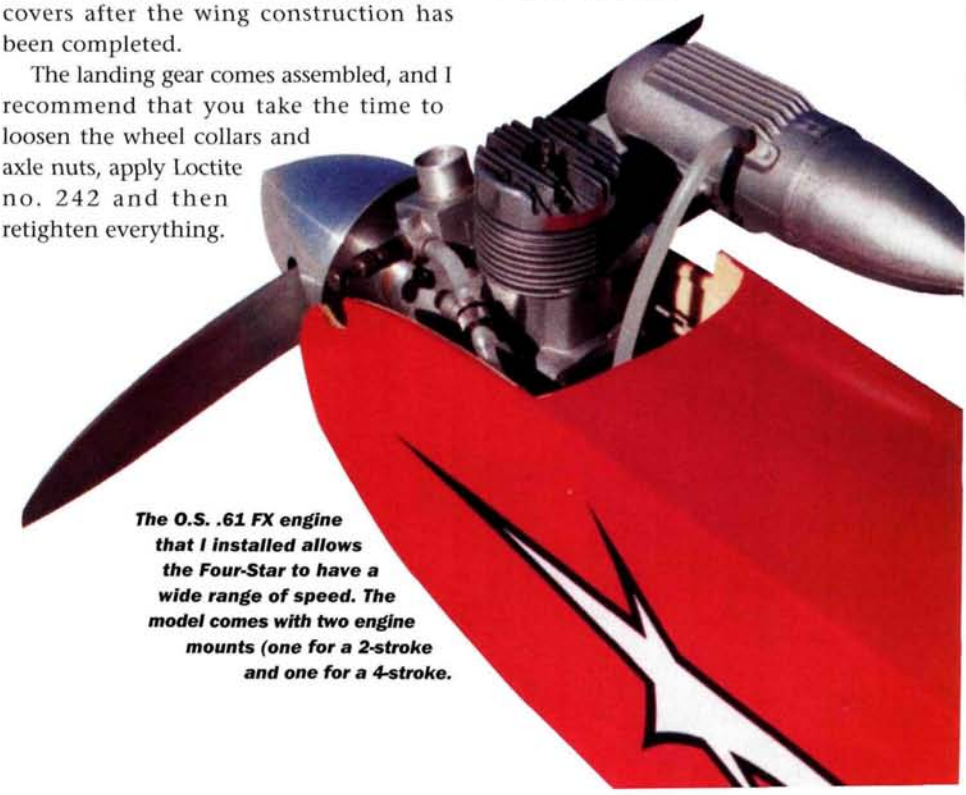
With all of these built-up and covered parts, a fuel tank, wheels, a spinner, landing gear and tailwheel assembly and a complete hardware package, the Sig Four-Star 60 is a deal at $199.99.

WING AND FUSELAGE

The wing panels fit together beautifully; I wish the ones I build would fit like this! Installing the aileron servos is basic; just make sure that you secure the aileron extension before you install it in the wing. I installed the one-piece hinges as the manual suggested and ended up with a close-fitting joint between the wing and aileron. Tip: the plastic bags that the wings come in make pretty good covers after the wing construction has been completed.

The landing gear comes assembled, and I recommend that you take the time to loosen the wheel collars and axle nuts, apply Loctite no. 242 and then retighten everything.

When you install the fuel tank, be sure that the tank's rubber stopper is on the left side of the fuselage. Hint: to prevent the fuel line from becoming lodged at the front of the tank during a less-than-perfect landing, insert a small piece of brass or aluminum tube in the fuel pick-up line in the tank. I always hold my aircraft nose-high and shake it to listen for a freely moving "clunk" before I fuel up.



The O.S. .61 FX engine that I installed allows the Four-Star to have a wide range of speed. The model comes with two engine mounts (one for a 2-stroke and one for a 4-stroke.

A slick set of engine mounts—perfect for 2- and 4-stroke engines—is included. Sig recommends that you install the engine mount with nuts and bolts instead of sheet-metal screws; take this advice.

TAIL FEATHERS

The instructions indicate that you will see a strip of uncovered balsa at the top rear of the fuselage. This is the fin spacer block, which you'll need to remove. But mine was covered and glued in! I carefully cut the covering with a no. 11 hobby-knife blade (so I wouldn't damage the small fillet blocks) to take care of that.

Make sure that the elevator joiner wire lies flat on your bench before you join the elevator halves, or you'll have your hands full when you try to flight-trim this bird! All of the tailpieces lined up perfectly, and I glued them into place with 5-minute epoxy.

RADIO AND FINAL TOUCHES

Everything is very straightforward in this part of the build. Sig provides four slick little silicone washers for the canopy's screw holes. These will prevent the screws from backing out and enlarging the holes, so you won't have to watch the canopy go bye-bye! Hint: glue small pieces of yellow Nyrod into each screw hole in the fuselage to act as inserts for the canopy screws. After I had connected everything electrical, I bolted the wing into place with the provided ¼-20 nylon bolts and turned on the radio to confirm that all of the surfaces moved in the proper directions. Sig's included aileron position guide (APG) allows you to simply hold the APG against the fuselage side next to the aileron and adjust as necessary for a precise setting. It's far easier and more precise than the familiar "eyeball" method of adjustment.

The Four-Star 60 balanced right on the money, and no additional ballast was required. All that was left to do was to add the decals, charge the batteries an head to the field!

FINAL THOUGHTS

The Four-Star 60 was a straightforward build; it's great to have parts that fit together so precisely! Intermediate and advanced sport pilots will appreciate its blend of maneuverability and stability. Sig notes that the Four-Star 60 is one airplane you will always want to take to the field, and that's definitely true. It's fun to fly, and that's the name of the game, isn't it?

APC Props; distributed by Landing Products (530) 661-0399; apcprop.com.
Futaba Corp. of America; distributed by Great Planes Model Distributors Co.; futaba-rc.com.
Great Planes Model Distributors Co. (800) 637-7660; greatplanes.com.
Hitec RCD Inc. (858) 748-6948; hitecrcd.com.
O.S.; distributed by Great Planes Model Distributors Co.; osengines.com.
Performance Plus; a division of West Coast Fuels (909) 899-4856.
Sig Mfg. Co. Inc. (800) 247-5008; sigmfg.com.

FLIGHT PERFORMANCE

TAKEOFF AND LANDING

Because it's a tail-dragger, the Four-Star 60 requires that you use a little up-elevator and some right rudder during the takeoff roll. I simply advance the throttle and, at about ½ throttle, the tail comes up and the plane is quickly airborne. Most takeoffs occur in about 50 feet.

Landings are almost automatic with this plane. At ¼ throttle, the plane settles nicely; you need only guide it to your touchdown point on the runway. Three-point landings are a piece of cake, and the model has good ground handling.

LOW-SPEED PERFORMANCE

To maintain straight and level flight at low speed, the Four-Star 60 requires about ¼ throttle and a touch of up-elevator. During low speed, the model tracks well and goes wherever it's pointed. When the Four-Star stalls, it usually falls straight ahead and allows a normal recovery. Its stall characteristics can best be described as trainer-like.

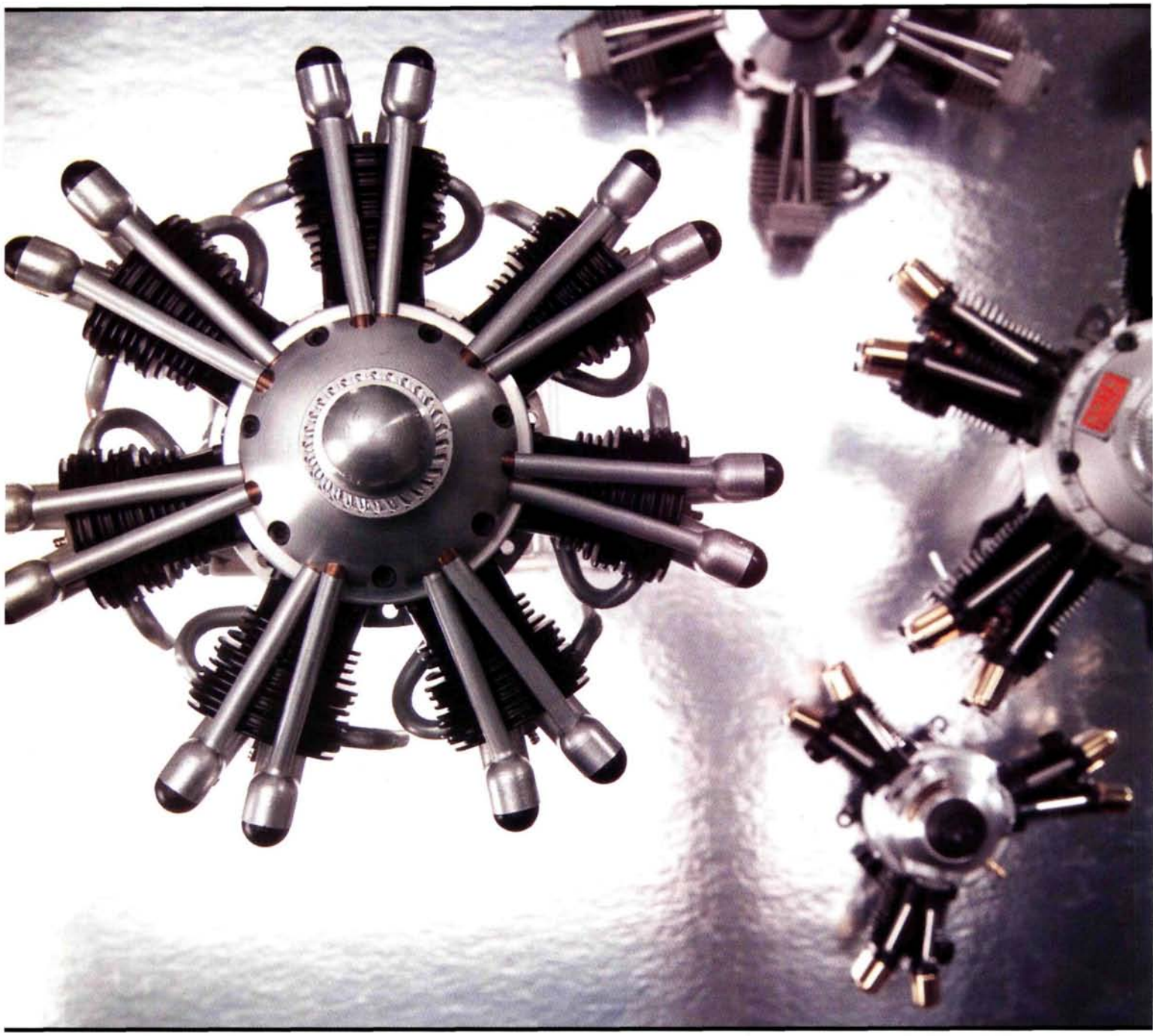
HIGH-SPEED PERFORMANCE

During high-speed flight, the plane tracks straight and solid. With the O.S. .61 up front, the Four-Star moves out rather smartly when the throttle is opened. Its large speed range helps a new pilot easily transition from a trainer to a plane with more performance. This quickly develops pilot skills and confidence.

AEROBATICS

The Four-Star 60 is very responsive to control inputs but not overly so. Large lazy loops are easy to do, as the plane tracks through them well. The plane rolls well, but to make the rolls axial, you do need to coordinate rudder and elevator inputs throughout the maneuver. Consecutive horizontal and vertical rolls are a pleasure to fly. Inverted flight requires some down-elevator, but the plane is quite stable in that attitude; I like that!

Overall, I found the Four-Star 60 to be a nice model to fly. As the pilot's skill and comfort levels increase, the Four-Star will rise to the occasion.



An old aviation adage says: "The only real airplanes have two wings and round engines!" It's that second part—the round engines—that makes a model airplane really stand out. There's something magical about radial engines; whether they have three, five, seven, or nine cylinders, round engines capture everyone's attention. The sound is unmistakable, and the look? As I said, they're in a class all by themselves.

This guide highlights some of the most popular radial engines available today. Whether you love classic civilian biplanes, early turn-of-the-century WW I dogfighters, or round-nose WW II warbirds, there's a radial engine to hang on each plane's nose. Let's check out some of this round-engine magic!

Opposite page, left: almost all radial engines are equipped with a single, rear-mounted carburetor feeding each cylinder with its own induction tube. Second from left: to expel its spent fuel charge, each cylinder has a short exhaust stack. Center: many engines have an optional exhaust-collector ring that's attached to each cylinder's exhaust stack; the ring directs all the exhaust to a single outlet. Second from right: in 4-stroke engines, each cylinder head contains valves and rocker arms. On the RCS 215, the rocker arms and pushrods are exposed! Far right: the Robart R780 has enclosed rocker arms, and the pushrods are inside the rod tubes.

PHOTOS BY DERON NEBLETT

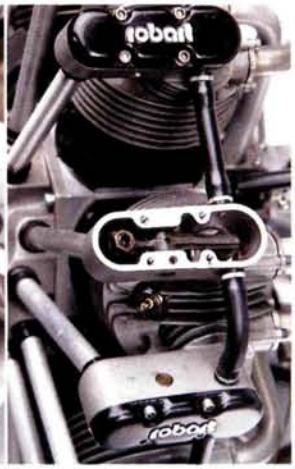
The MAGIC of

by Gerry Yarrish

Radial ENGINES

These Beauties are Beasts!

A GUIDE TO RADIAL POWER AND OPERATION



DESIGN BASICS

Though this article is specific to the radial engine, there are two types of round engine. The earliest was the rotary engine, and in this configuration, the propeller was attached to the engine case and the rear-facing crankshaft was attached to the airframe. The engine and prop revolved in unison around the fixed crankshaft. This was the most popular engine type during WW I and was used by almost all countries to power many of their flying machines (see "Replica Engines" sidebar).

Developed soon after WW I, the radial engine had its case mounted solidly to the airplane, and the propeller was attached to the crankshaft. Powered by multiple pistons moving up and down in their cylinders, the crankshaft faced forward. Both engine types were air-cooled. Basically, a radial engine is made up of multiple 4-stroke cylinders attached to a common engine case. Each cylinder has its own intake and exhaust valves, and commonly, a single carburetor feeds all the cylinders. For exhaust systems, radials have either individual exhaust stacks or they are attached to a single collector ring. Either way, the sound of a running radial is unforgettable!

click trip MODELAIRPLANENEWS.COM FOR A VIDEO ON HOW FULL-SIZE RADIAL ENGINES WORK

ONBOARD IGNITION

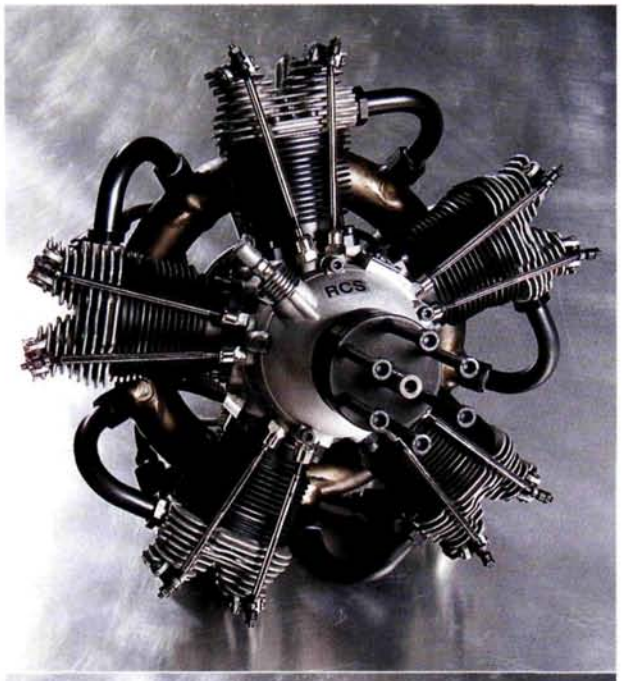
Several radial engines come with their own ignition system, or they're available separately from the engine's distributor. Some do not come with an ignition system, but a recommended aftermarket system is usually available. For several reasons, radial engines should be equipped with an onboard ignition system.

Each cylinder has its own glow plug, and it is very difficult—if not impossible—to use several hand-held glow-driver batteries to start a radial engine. Chances are that a battery igniter could flip off the plug and hit the prop; not good!

The onboard ignition system is the best setup; it is wired with enough connector caps and leads to power each plug, and the caps are securely locked onto the plugs. A rechargeable battery pack supplies power to all of the plugs and is turned on and off with a master ignition switch. All you do is flip the switch and start the engine.

Many ignition systems can also be controlled by the position of the throttle stick. Typically, the ignition system supplies power to the plugs when the throttle is below ¼. As the throttle is advanced to ½ or ⅔, it shuts off because the engine is operating at high enough rpm, and the increased heat keeps all the plugs lit. This type of setup is recommended for two reasons. First, it conserves power because the battery doesn't keep the plugs energized all the time. Second, when the throttle is lowered for cruising around and for landing, the engine turns at lower rpm. This cools the plugs and decreases the chances that one or more of the plugs will stop working. Losing one or more plugs greatly reduces the engine's power. The best way to maintain a happy radial engine is to keep all of its plugs firing.

Top: the engine installation for Nick Ziroli's Stearman PT-17. Notice the multiple orange ignition-system wires that lead to each of the Robart R780's glow plugs. Left: most radial engines are 4-stroke, glow-powered engines. Each cylinder head has one or more glow plugs. Above right: many radial-engine makers recommend the McDaniels onboard ignition system. It is available in several versions for single and multi-cylinder engines up to 18 cylinders! Below right: the onboard ignition module from the RCS 215 engine. Note the robust wire connector for the gasoline-ignition engine.



RCS 215

Distributor: RC Showcase

Number of cylinders: 5

Displacement: 13.1ci (215cc)

Bore: 1.535 in. (39mm)

Stroke: 1.417 in. (36mm)

Power output: 13.5hp (turns a 30x12 prop at 5,600rpm)

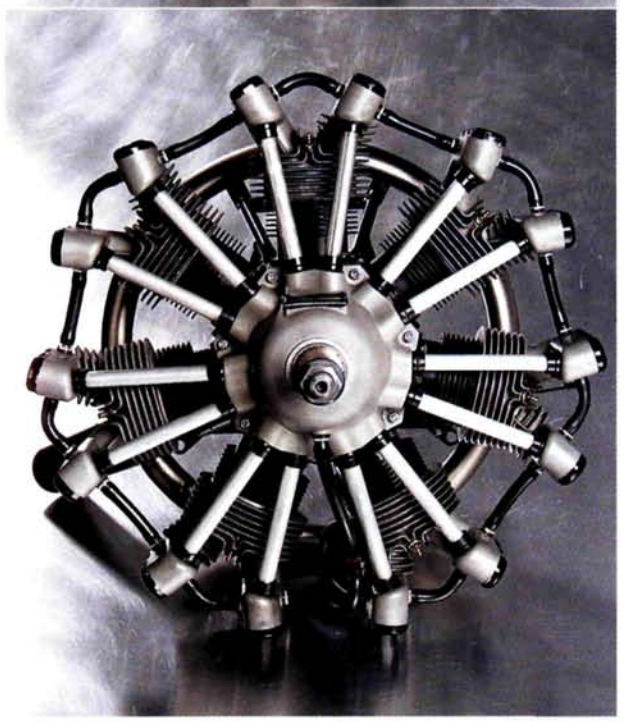
Weight: 11 lb.

Major diameter: 12.25 in. (311.15mm)

Price: $2,375

Comments: this big radial runs on gasoline and comes with a 4.8 to 6V microprocessor-controlled, auto-advance onboard ignition system. It has a 6-bolt prop hub and uses miniature NGK CM-6 spark plugs. A standard choke-equipped Walbro carb is positioned center aft on the engine case and inside the circular cast-aluminum engine mount.

RC Showcase (301) 374-2493; rcshowcase.com.



ROBART R780

Distributor: Robart Mfg.

Number of cylinders: 7

Displacement: 7.8ci. (128cc)

Bore: 1.125 in. (28.575mm)

Stroke: 1.125 in. (28.575mm)

Power output: 10hp (turns a 26x12 prop at 5,500rpm)

Weight: 7.65 lb.

Major diameter: 10 in. (254mm)

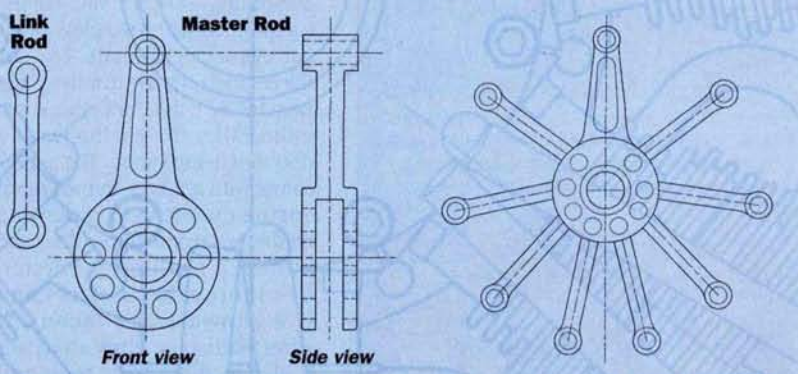
Price: $4,000

Comments: the Robart R780 is a 22.5-percent-scale miniature of a Jacobs 7-cylinder radial engine. The output shaft has a 6-bolt prop adapter that is slipped over a tapered brass collet and is attached to the main output shaft with a single nut in the center. Pistons feature twin rings, and the hemi-head design uses large valves with steel seats and bronze guides. Roller lifters and ball bearings are used throughout, and the engine is equipped with an oil pump. A boost fan aids air intake. A steel tube mount with rubber dampers is included. Collector-exhaust ring and 7-cylinder onboard glow driver, battery and charger are available separately.

Robart Mfg. (630) 584-7616; robart.com.

THE RADIAL CONNECTION

To build a radial engine, you can't just take several single-cylinder engines and stick them all together with a common crankcase. The challenge lies in joining all the connecting rods to a single crankshaft. Unlike a conventional multi-cylinder engine, a radial engine has all its pistons arranged on a single plane, and only one connecting rod (the master rod) is attached to the crankshaft. All the other connecting rods (link rods) are attached to the bottom of the master rod. The large web of the master rod follows the path of the crankpin and transfers the power from all the pistons to the crankshaft. Pins similar to the wristpins that connect the pistons to the connecting rods attach the link rods to the master rod's web. This simple setup works very well and contributes to the radial engine's reliable power output.



This illustrates how the multi cylinders and pistons are connected to a single output. The master rod and link rods that are connected to it form the mysterious, spider-like connection that's inside every conventional radial engine.

PHOTOS BY JIM HEBERT

RADIAL CARE AND OPERATION

Well-known scale-RC designer Nick Ziroli Sr. has been flying for many years and has used all types of engines to power his designs. Nick was one of the first modelers to operate the Robart 7-cylinder R780 engine, and he has used it in a number of his competition models. Here's what Nick says about operating and caring for round engines.

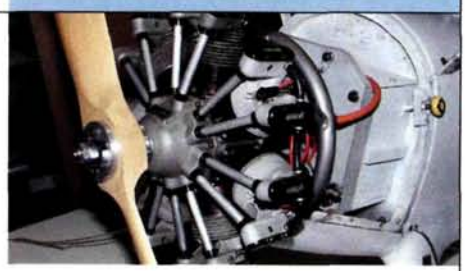
One of the great things about radial engines is their scale appearance. This and their smooth operation make them ideal for many scale models. The Robart R780 is, in fact, a 22.5-percent-scale copy of a Jacobs 7-cylinder engine. It has enclosed rocker arms and pushrods and a welded, steel-tube engine mount. I have flown both my 87-inch-span Stearman PT-17 and my 100-inch SBD Dauntless dive-bomber with the R780.

For fuel, I use my own mixture of alcohol, 8-percent Klotz Benzoil and just a kick of nitro to improve its idle. Typically, I run a 24x12 prop. On my Dauntless, I flew with a 3-blade 25x12 that gave very good performance. I use a McDaniels onboard glow driver and O.S. F plugs to fire all the cylinders.

To start the engine, I close the choke, turn it over a few times, advance the throttle slightly and hit it with my belt-reduced Miller RC starter; when it starts, I open the choke. I use a 3000mAh battery for the onboard glow driver, and it is set to supply power only when the throttle is below ¼. This makes engine starting easy, and it ensures that the engine operates reliably at idle and at reduced throttle settings. I charge the glow-driver battery between each flight.

For extended engine storage, I run the engine dry of fuel and then remove the cylinder-head oil-supply line from the crankcase. I add a bit of after-run oil (Marvel Mystery Oil) and turn the engine over several times to draw it into the crankcase. Aside from checking valve clearances, very little maintenance is required to keep the R780 happy. *—Nick Ziroli Sr.*

Above: Nick Ziroli's new Stearman PT-17 is an ideal candidate for a radial engine. Powered by the Robart R780, the biplane looks and flies very scale! Below: close-up of Nick's engine installation.



O.S. SIRIUS FR5-300

Distributor: Great Planes Model Distributors

Number of cylinders: 5

Displacement: 3.035ci (49.763cc)
Bore: 0.945 in. (24mm)

Stroke: 0.866 in. (22mm)

Power output: 4hp at 8,500rpm
Weight: 94.3 oz.

Major diameter: 9.25 in. (234.95mm)

Price: $1,349.99

Comments: the Sirius FR5-300 features pushrod-driven overhead valves, a gear-driven camshaft, a ball-bearing-supported crankshaft and ringed pistons. It comes with a motor mount with mounting hardware, a single locking prop-nut assembly, a display stand, a gauge-tool set, a glow-plug extension-wire harness and five O.S. "F" glow plugs.

O.S. Engines; distributed by Great Planes Model Distributors (800) 637-7660; osengines.com.

SAITO FA-325R5D

Distributor: Horizon Hobby Inc.

Number of cylinders: 5

Displacement: 3.234ci (53cc)

Bore: 0.976 in (24.8mm)

Stroke: 0.866 in. (22mm)

Power output: 3.8hp (turns 20x8 to 20x10 props)

Weight: 84.86 oz. with muffler

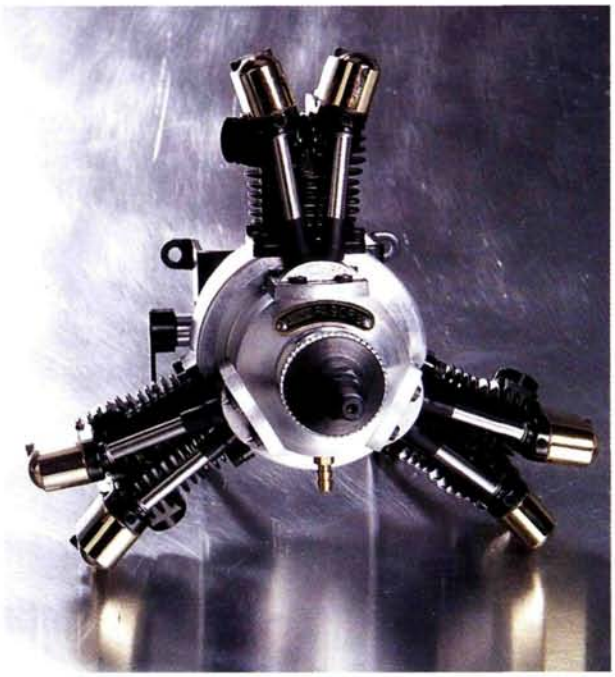
Major diameter: 9.125 in. (231.775mm)

Price: $1,449.95

Comments: this powerful 5-cylinder, 4-stroke ABC engine is equipped with two glow plugs per cylinder (10 total). To start the engine, only the rear five plugs need to be lit; the front plugs come online after the engine reaches operating temperature. The engine comes with a strong, formed-metal engine mount with mounting hardware, engine primer lines and fittings, a fuel primer injector, five short exhaust stacks and five glow-driver attachment wires with plug clips attached. It also includes basic tools and a high-efficiency fuel filter.

Saito Engines; distributed by Horizon Hobby (800) 338-4639; horizonhobby.com.

Saito also offers the FA-170R3 ($799.95) and FA-450R3D ($1,069.95) 3-cylinder radial engines.



SAITO FA-90R3

Distributor: Horizon Hobby Inc.

Number of cylinders: 3

Displacement: .92ci (15.09cc)

Bore: 0.787 in. (20mm)

Stroke: 0.629 in. (16mm)

Power output: .95hp (turns 13x6, 13x8, 14x6 props)

Weight: 29.98 oz. with muffler

Major diameter: 7 in. (177.8mm)

Price: $699.99

Comments: the FA-90R3 3-cylinder, 4-stroke engine is the smallest in Saito's radial lineup and is ideally suited to .60 to .90 biplanes and other models with round engine cowls. It has a formed-metal engine mount, ABC cylinder/piston construction and a single, rear-mounted, twin-needle carb. Basic valve-adjustment tools, three glow-plug driver wires and three short exhaust pipes are also included.

Saito Engines; distributed by Horizon Hobby (800) 338-4639; horizonhobby.com.

TECHNOPOWER 9C

Distributor: TechnoPower Engines

Number of cylinders: 9

Displacement: 4.06ci (66.51cc)

Bore: 0.875 in. (22.23mm)

Stroke: 0.750 in. (19.05mm)

Power output: turns 18x8 to 24x6 props

Weight: 73 oz.

Major diameter: 9 in.

Price: $2,580 (call for pricing updates as engine development continues)

Comments: under new management, TechnoPower has plans to re-release four of the company's most popular radial engines—the 7A (0.625-in. bore), 7B (0.750-in. bore), 9B (0.750-in. bore) and the 9C (specs above). TechnoPower is updating the engines' designs and drawings using CAD programs and upgrading engine materials and manufacturing processes. The first engine to be offered will be the 9C along with an optional exhaust-collector ring and an engine mount. The 7-cylinder 7B (⅛ scale) and the 9-cylinder 9C (⅕ scale) are shown.

TechnoPower Engines (800) 741-8150; technopower.com.

REPLICA ENGINES "GNOME MONOSOUPAPE ROTARY"

No discussion of round model engines would be complete without mention of the Replica Engines rotary Gnome. This ¼-scale miniature is an exact copy of the engine made famous during WW I, and it operates in exactly the same way: the prop and engine case revolve around the fixed crankshaft. If you are a lover of giant-scale Great War aeroplanes, this is the ultimate powerplant for you!

SPECS

Engine: ¼-scale 1913 "Gnome Monosoupape Rotary"

Distributor: Replica Engines

Number of cylinders: 9

Displacement: 3.97ci (65.057cc)

Bore: 0.750 in. (19.05mm)

Stroke: 1 in. (25.4mm)

Prop: 24x10

Rpm: 2,800

Price: $3,800

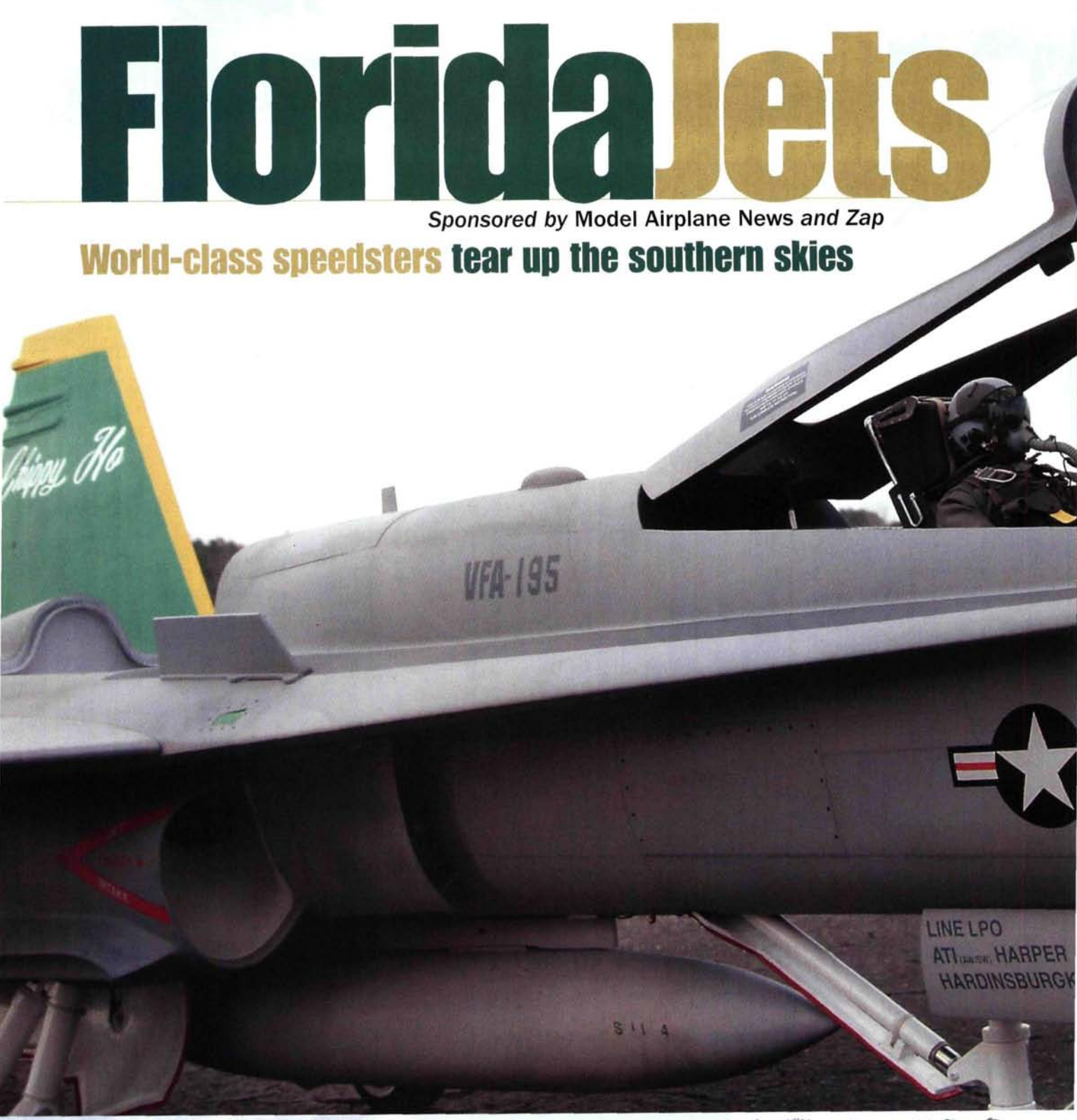
Comments: first used around 1909, the full-size Gnome was the first really successful aircraft engine, and all future rotary engines were variations on its simple, effective design. The single-valve Gnome had no carburetor as such; air and fuel entered the engine through the stationary, hollow crankshaft, then entered the cylinders via a series of ports opened by the piston at the bottom of the intake stroke. The valve timing was such that air was admitted into the cylinders at the end of the exhaust stroke. The cylinder was already filled with air when the very rich fuel mixture was admitted through the ports. The air/fuel mixture was then compressed and combusted to complete its power cycle. The engine had no throttle and ran wide open, or not at all. An interrupt-ignition switch cut power to some, or all, of the spark plugs to control engine rpm.

The Replica Engines ¼-scale Gnome faithfully reproduces the design and operation of the full-size engine. It has 4-cycle, ported intake and poppet-valve exhaust, a hardened, ground crankshaft and valves, roller cam followers and ¼-32 spark plugs. An electronic-ignition and coil system is also available.

FloridaJets

Sponsored by Model Airplane News *and Zap*

World-class speedsters tear up the southern skies



The many jets lined up on the runway in competition for judging and up-close viewing by the spectators.

BEST MILITARY

This giant Cessna Dragonfly A-37-B has a 144-inch wingspan and is powered by two Jet Cat P-160s. Built by Henry Nugent, owned by Sung Kim and flown by Jim Hiller, this model features an excellent finish and details. It won Best Military (post-1960) and Critics' Choice in competition.

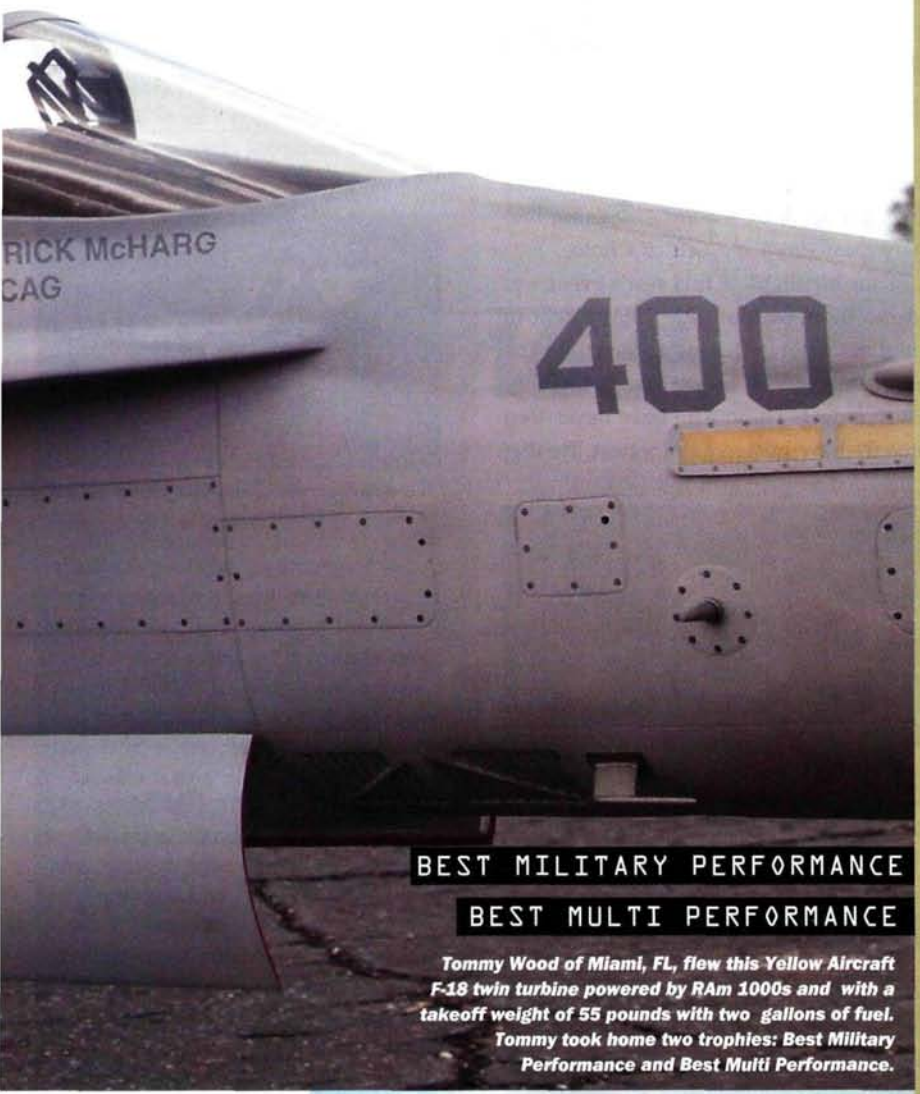
by Jerry Smith

Every year, jet enthusiasts from across the country gather at Flagler County Airport near Bunnell, FL, for Florida Jets—one of the biggest and best jet events around—and 2003 was no exception. Hosted by the Flagler County Rams, this four-day, high-speed extravaganza featured 197 registered pilots who completed more than 400 heart-stopping flights. The site itself is ideal; the centerpiece is a 3,500x100-foot paved runway that's open on both ends and provides pilots with more than enough room to drag 'em in.

Friday was the best day for the pilots and spectators. Thanks to beautiful weather and temperatures in the high 70s, the skies were full all day long. In the afternoon, the models were lined up on the runway and entered in the competition. The judges decided which entrants would receive the Special Achievement Sponsorship Awards, and after the judging, the spectators were allowed to view and photograph the models.

Unfortunately, a storm front moved in on Saturday, and the organizers were ordered by airport authorities to shut down at 11 a.m. The entire day wasn't wasted, however; the awards were presented at a banquet that evening, and 148 people turned out to congratulate the recipients.

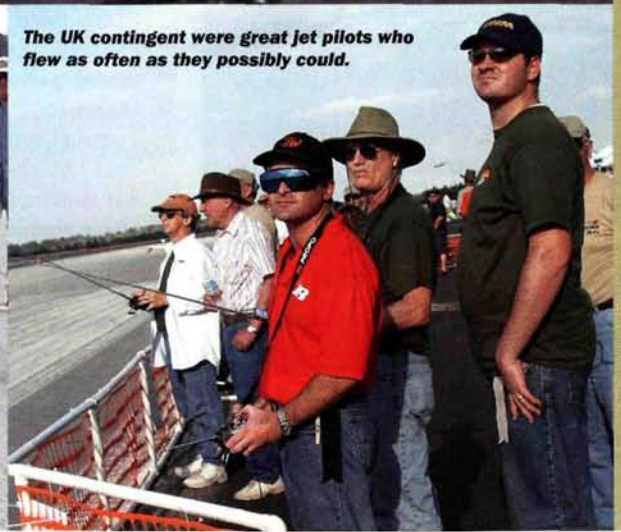
Despite somewhat windy conditions, flying resumed on Sunday, and Florida Jets 2003 ended on a high note.



BEST MILITARY PERFORMANCE

BEST MULTI PERFORMANCE

Tommy Wood of Miami, FL, flew this Yellow Aircraft F-18 twin turbine powered by RAm 1000s and with a takeoff weight of 55 pounds with two gallons of fuel. Tommy took home two trophies: Best Military Performance and Best Multi Performance.



The UK contingent were great jet pilots who flew as often as they possibly could.

PHOTOS BY JERRY SMITH

Bob Violett Models dominated the flightline. Those shown here were all flown during the event.

Among the most popular models participating this year were planes from BVM, RAm and Jet Cat. Scale and sport models took part—many with clean lines and fancy paint jobs—and all looked great. Built by Henry Nugent, a full-time model builder, and owned by Sung Kim, one of the coolest models was a 12-foot-wingspan Cessna A378 Dragon Fly that weighed in at 52 pounds! Powered by two Jet Cat P-160 turbine engines, the A37B took home awards for Best Military (post-1960) and Critics' Choice.

A major highlight of this year's event was the demo flight by four-time Tournament of Champions winner Quique Somenzini. The precision maneuvers he executed were simply outstanding. Those who have never seen Quique fly have missed quite a treat. He flies

Right: Bob Violett makes a landing approach with his great-looking F-100.

Below: Bryce Watson of Ft. Lauderdale, FL, flew this gorgeous Israeli fighter—the Lavi ("young lion"). The German kit plane has a 78-inch wingspan, weighs 31 pounds, is powered by a Jet Cat P-120 and has BVM wheels and brakes. The turbine is mounted in the rear—no tailpipe.

Left: the SimJet flying team, called the Dragons, sponsored by Traplet Publications of the UK. Shown, left to right, are Paul Leighton, John Palmer (Team Leader), Bob Ryan and Steve Ansell (Team Manager). All the members fly Kangaroo's sport jets—with SimJet Turbines, of course.

TURBINE TECH

Have you ever sat in an airliner at 35,000 feet, gazed out at the engine pod and wondered how the jet engines work? How can they move an 85-ton airplane through the air with such unbelievable thrust and at such incredible speeds?

Jet engines—also known as gas turbines—work as follows: a fan draws air in at the front, and a compressor (comprised of many blades) compresses the air. The compressed air is then sprayed with fuel, and an electric spark ignites the mixture. The burning gases expand and are then blasted out through a nozzle at the rear of the engine. As the jets of gas shoot backward, the engine and the aircraft are thrust forward.

Turbo Jet Technologies' (TJT) 3000 model-airplane jet turbine.

Two common types of jet engines are turboprops and turbofans. In turboprop engines, the exhaust gases are used to rotate a propeller attached to the turbine shaft; this helps conserve fuel at lower altitudes. A turbofan engine uses a fan to produce additional thrust to supplement the thrust created by the basic jet engine; this results in greater efficiency at high altitudes.

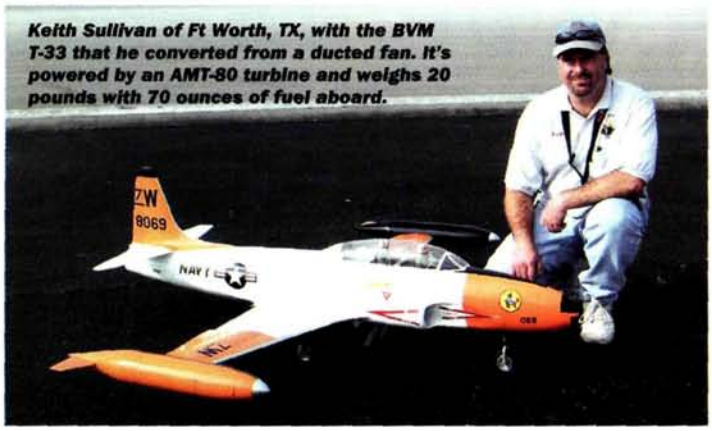
Another source of power is the ram jet, which has no moving parts. It relies on air that's forced through a duct and then mixed with fuel to provide thrust through a venturi-shaped tailpipe. It doesn't develop static thrust, and it requires some form of booster for takeoff. The ram jet is used primarily on guided missiles.

Jet engines' advantages over piston engines include lighter weight, greater power, simpler construction and maintenance (thanks to fewer moving parts) and efficient operation with cheaper fuel.

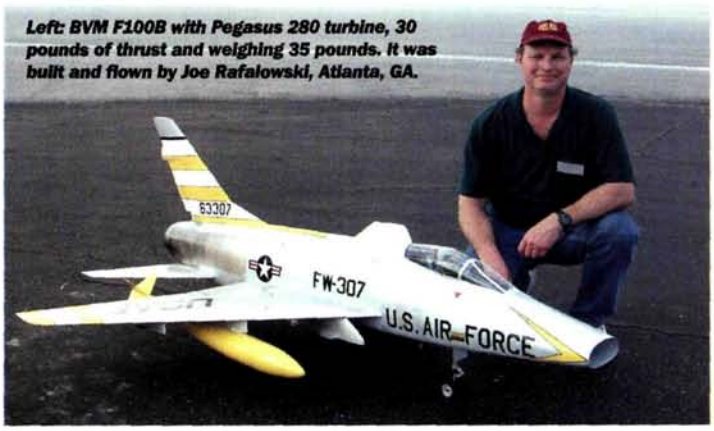
Model-airplane jet engines work on the same principle as full-size ones. In the past, it was cumbersome to start these engines. Now, all the elements required for starting can be activated automatically by pushing a button. In the future, we may see turboprop or turbofan model engines—perhaps even some with afterburners. For now, we can rejoice at the sight of gas-turbine-powered models flying effortlessly through the sky with incredible realism.

SPECIAL ACHIEVEMENT SPONSORSHIP AWARDS

WINNER	MODEL	AWARD	SPONSOR
Sam Snyder	Swallow	Designer Achievement	*Model Airplane News*
Dell Pratt	–	Special Recognition	Academy of Model Aeronautics
Francis Pischner	Bandit	Best Sports Performance	JR Radio
Tommy Wood	F-18	Best Military Performance	TJT (Turbo Jet Technologies)
John Christensen	F-86	Best Military, pre-1960	The Zap Gang
Sung Kim	Cessna A37B	Best Military, post-1960	Jet Cat USA
Vern Kramer	Bobcat	Best Sport Jet	Modellbau USA
Don Yockey	L-10-11	Best Civilian Jet	Ray and Robin's Hobby Center
Tom Dodgen	FJ-3 Fury	Best Ducted Fan	FTE Turbine Works
Tommy Wood	F-18	Best Multi Performance	Airtronics
Gustavo Campana	SU-27	Engineering Excellence	FTE (Frank Tiano Enterprises)
Mitch Weiss	F-100	Best Craftsmanship	BVM (Bob Violett Models)
Sung Kim	Cessna A37B	Critics' Choice	–
Lucas Vallego	MiG-29	Critics' Choice (runner-up)	–



Keith Sullivan of Ft Worth, TX, with the BVM T-33 that he converted from a ducted fan. It's powered by an AMT-80 turbine and weighs 20 pounds with 70 ounces of fuel aboard.



Left: BVM F100B with Pegasus 280 turbine, 30 pounds of thrust and weighing 35 pounds. It was built and flown by Joe Rafalowski, Atlanta, GA.

Above: Quique Someninzi, four-time TOC champ, wowed the crowd with his 37.5-percent Yak 54 during a break-time demo. Note the elevator throw and lots of smoke.

Right: Jason Somes of Los Angeles did a great demo with this turbine-powered helicopter. An all-around pilot, Jason also flies jet airplanes extremely well.

a 37.5-percent-scale Yak 54. Built by Wayne Ulery, the 120-inch-wingspan Yak features JR radio gear throughout and is powered by a 3W QS 1.50 with 3W exhaust canisters to damp the noise.

The other demo performer was Jason Somes, who flew his turbine-powered helicopter—one of two at the event. Turbine-powered helicopters are fairly new to the scene but are pretty cool, nonetheless, and they're sure to become increasingly popular in the coming years.

A number of manufacturers pitched tents to show off their wares. Among them were PCM Models, Bob Violett Models, Turbo Jet Technologies, Frank Tiano Enterprises, Pro Mark Graphics, AMT USA, Aviation Design and SimJet; all are very active in the model airplane and turbine markets. Pilots and spectators appreciated the chance to see the latest and greatest products firsthand.

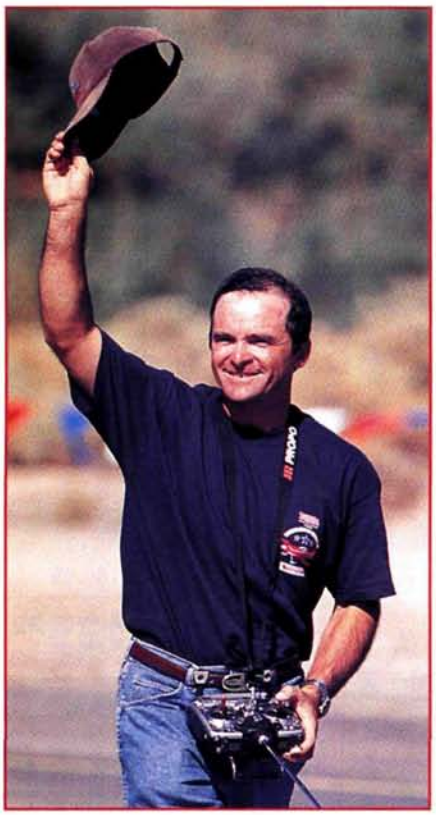
Many thanks to Frank Tiano, founder of Florida Jets and tireless promoter of the jet model industry, contest director Mike Bubricky, announcer Sam Wright, members of the Flagler County Rams and all the participating pilots. You all contributed to the rousing success of this year's event. Florida Jets 2003 represents another milestone in an event that has become synonymous with the term "world class." Of course, it will all happen again next year, and if you haven't yet had the pleasure of attending, I highly recommend the trip.

3D aerobatics setup

by Quique Somenzini

Editor's note: with multiple Tournament of Champions (TOC) and F3A U.S. National Champion titles to his credit, Quique Somenzini is extremely well known in aerobatics circles. Model Airplane News *is pleased to present Quique's second article in his series on freestyle aerobatics. The first article, on the "Roller Coaster," appeared in our April 2003 issue.*

Although specific flying techniques are important in 3D aerobatics, setting up your airplane correctly will greatly help you to perform maneuvers better and more easily. This month, let's take a look at the airplane and radio setup.



RUDDER, ELEVATOR AND AILERON AREA

To perform most 3D aerobatic maneuvers, including the Roller Coaster described in the April issue, your plane must have large control-surface areas. In fact, the rudder, elevator and aileron surfaces are the heart of 3D aerobatics. How large should they be? Well, as a percentage, the elevator should be at least 40 percent of the total horizontal stabilizer area, the rudder at least 50 percent of the fin area and the ailerons at least 20 percent of the total wing area. The deflection is as important as the area. The elevator should deflect at least 45 degrees each way, the rudder at least 45 degrees and the ailerons at least 35 degrees. The combination of these large surface areas and deflections allows you to control the airplane even when less air flows over the control surfaces.

During the Roller Coaster, for instance, the airplane is flying at such a low airspeed that the airflow generated by the propeller (the propwash) is the only thing that allows the plane to continue to perform such a large change in attitude. At the top of the Roller Coaster, when the airplane is at zero airspeed, the propwash blows over the tail surface and the inside area of the ailerons. To maneuver in this situation, your plane must have large control surfaces that will be able to use this very small airflow. Extra long and wide ailerons help considerably to better maneuver the airplane at zero airspeed.

Even with extra-large control surfaces that have enough deflection, you must be able to move those surfaces safely and with authority. That's why a good linkage system and powerful digital servos are important. Digital servos have a greater holding power than standard servos do; it is so important to avoid any chance of flutter, which is significantly increased when you enlarge the control surface and its deflection!

FREESTYLE AEROBATIC TECHNIQUES

CENTER OF GRAVITY

Your plane's center of gravity (CG) is also a key factor in performing wild 3D aerobatics. As you move the CG rearward, the plane becomes less stable, but pitch and yaw control become more responsive and more sensitive. Most aerobatic airplanes have CGs that are around 32 to 33 percent of the wing's mean aerodynamic chord (MAC). If you move the CG farther back, you will gain even more pitch and yaw authority, but the airplane will simply be too unstable. It depends on the airplane, but the best balance between aerobatic and unstable is usually achieved when the CG is about 37 to 40 percent of the MAC.

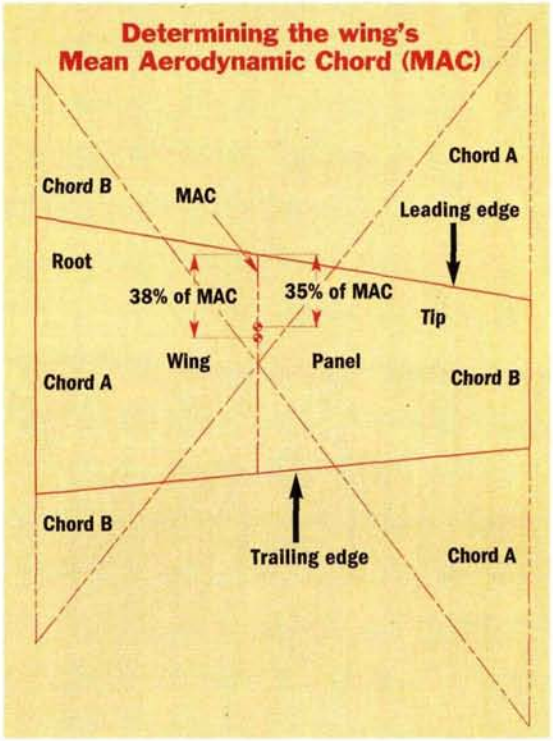
When you fly maneuvers such as the Roller Coaster, flat spin, Cobra (Harrier), waterfall, Pendulum, etc., your plane's CG is very important; simply having large control surfaces isn't enough to allow the plane to pitch properly. Note: when you do a maneuver that's like a torque roll, the CG is not a key element. For that, a plane with a standard, aerobatic CG of about 32 percent MAC will be fine, and you won't gain any more maneuverability by moving the CG rearward.

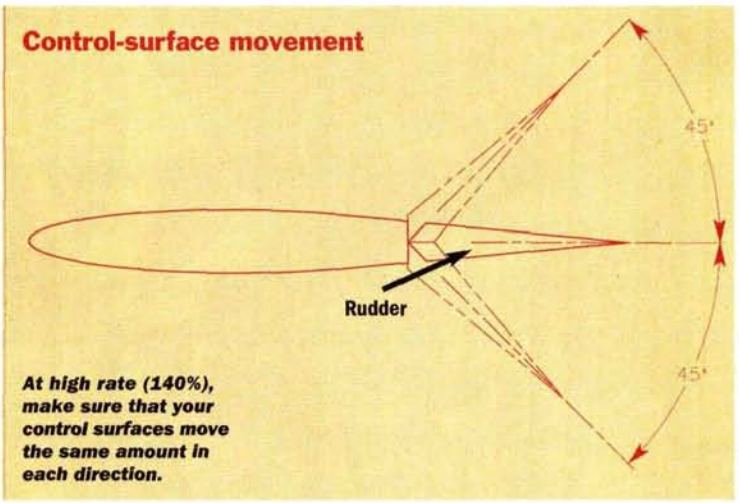
As you know, the best CG position for 3D aerobatics is a compromise; the real challenge is to find the CG that will give the airplane the best overall balance for most maneuvers. A freestyle program

should be balanced with a good mixture of 3D and precision aerobatic maneuvers, and your performance should be smooth and show control at all times. If you move the CG rearward, your plane will more easily perform wild 3D maneuvers, but it won't fly as precisely or solidly. On the other hand, if the airplane is nose-heavy, you'll have a solid airplane with show precision, but you won't be able to execute wild 3D aerobatics! You need to end up with a CG that's between these extremes. For their freestyle routines at TOC, most pilots move the CG rearward by adding weight at the tail.

This point may differ for various planes and pilots. I like to fly a plane that has a CG that's at 35 percent of the MAC for precision maneuvers and then move it back to about 38 percent for the freestyle portion of the competition.

The illustration shows how to find the MAC and then the CG. I like to use these numbers as a reference, but I adjust the final CG by flying the airplane. I've found this is the best way to correctly set my airplanes, so they all "feel" the same and have the same trim characteristics.





At high rate (140%), make sure that your control surfaces move the same amount in each direction.

FLIGHT-TESTING THE CENTER OF GRAVITY

It's easy to fine-tune the CG for precision maneuvers: fly the airplane upright and level, pull to 45 degrees (at full throttle), and do a ½ roll to inverted. The airplane should fly inverted by itself in a straight, 45-degree line for 2 to 3 seconds and then start to fall toward the canopy (you should barely have to push the elevator stick forward to keep the airplane flying in a straight line).

To perform 3D maneuvers, fly your plane upright and level at about ½ throttle. Roll the plane to inverted; it should fly by itself in a straight, level line for 3 to 3½ seconds and then start to fall down toward the canopy (you should barely have to push the elevator stick forward to maintain level inverted flight). If your airplane climbs when it is inverted, it is too tail-heavy; in my opinion, you crossed the line between precision and instability. If you were to watch my CG flight tests with the model flying inverted, you would notice that for precision flying, I try to fly the plane at a 45-degree angle; for freestyle, I fly it level. The difference of 2 to 3 percent in the CG locations is the real difference between precision and freestyle airplane setups.

When you know the CG that is best for various aerobatic maneuvers, you can prepare the airplane for optimum performance. For example, when you use torque rolls, snap rolls and other precision maneuvers in your freestyle routine, it's fine to fly your plane with the same CG as you use for precision aerobatics. This is not the case if your freestyle program has more 3D maneuvers involved.

RADIO SETUP

To perform 3D aerobatics, you must have a good radio setup. Your radio is a key element to perform a freestyle mixture of 3D and precision aerobatics. This doesn't mean that you must have top-of-the-line radio equipment to do freestyle aerobatics, but there are two radio features that will make your flying a lot easier: dual rates and exponential. With its large control surfaces, high deflection and rear CG, your airplane will be very sensitive and responsive, so you'll need to make good use of your radio programming. Flying smooth, precise and graceful aerobatics while maintaining a good "geometry" at high airspeed is completely different from flying at low speeds and making big pitch, yaw and rotation changes, such as those demanded by 3D aerobatics. This is where using exponential and dual rates comes in.

There are probably as many ways to program a radio as there are pilots because most pilots fly by "feel." With this in mind, I will explain how I adjust my radio for freestyle. I hope this will help you with your setup.

Many 3D aerobatics need maximum deflection on all three control surfaces, so I set the high rates on elevator, rudder and ailerons to 140 percent. Always check the linkages, arms and control horns and make sure that the servos move freely at this deflection. Make sure that each elevator travels the same distance up as it does down, and do the same for the ailerons.

After you've checked everything, adjust the low rates. But first consider, "When will I use the low rates?" I use low rates for "normal" flight and use high rates for flying snap rolls, spins and, of course, 3D aerobatics.

Adjustment of the low rates is more complicated because each includes the rate and the exponential, while the high rate just involves the exponential. Low rates can also vary a lot between pilots. For my low rates, I use 25 to 30 percent for the elevator, 80 to 90 percent for rudder and 60 to 70 percent for ailerons. I'm sure that these numbers will be a good place for you to start, too; these are what I use with a new airplane before I give it a last fine-tuning at the field.

I'll cover these final field adjustments and a new maneuver—the "Pendulum"—in the next article. Until then, continue to enjoy what we like most: aerobatics! ✈

S.E.5a WWI Scout

by John Simmance

An easy-to-fly giant-scale vintage bipe

Designed by H.P. Folland, the S.E.5 was a Royal Aircraft Factory single-seat "scout" aircraft. After solving early design and engine delivery problems, Royal Aircraft Factory designated the new plane the S.E.5a. It had shorter, stronger wings and a headrest for the pilot. The S.E.5a soon acquired a formidable reputation for downing enemy aircraft.

Maj. James Byford McCudden, V.C., flew S/N B4863—"aircraft G" model. It had a geared Hispano-Suiza engine with a 4-blade propeller, short exhaust pipes and a steel-tube undercarriage. Striving for perfection, McCudden often modified his own aircraft, and he scored 53 "kills" with it.

The model S.E.5a is fairly complicated to build and isn't for beginners but for advanced builders. I first flew my design in Colorado at 6,000 feet above sea level during the summer of 1996. Spanning 71 inches, it weighed slightly more than 17 pounds and was easy to fly. I originally drew it on paper, and then I redesigned the model in CAD as a lighter structure weighing about 15½ pounds, depending on the engine used. With a wing area of 1,862 square inches, expect a wing loading of around 19 ounces per square foot.

CONSTRUCTION NOTES

This model sacrifices simplicity for construction authenticity to resemble the full-scale aircraft. Skilled modelers won't need much in the way of detailed instructions; those who do should visit the *Model Airplane News* "Click Trip" site. If you decide to cut your own parts from the patterns given on the plan set, do it this first and make all the wire and metal parts at this time, too. Alternatively, order the laser-cut plywood and balsa parts package. It doesn't include any ⅜- or ¼-inch ply parts; you make them by laminating ⅛-inch-thick pieces of plywood together to make ¼- and ⅜-inch thick parts.

• **Fuselage.** The landing-gear design doesn't easily allow the lower wing to be removed to allow access to the radio compartment. Therefore, for access and to preserve the cockpit area for scale details, the fuselage is split at the upper longeron level, and the entire upper fuselage can be lifted off from the rear of the cowl to behind the cockpit. This part is secured by four long bolts that pass through the bottom of the fuselage, and it supports the cabane strut structure. This arrangement provides maximum airframe strength under flight loads.

Before you start to build the fuselage, build the upper wing center section because you'll use this assembly later to position the cabane struts. The fuselage is formed around a central self-aligning box structure; the engine firewall is slanted to provide the correct side thrust and downthrust. The design incorporates a cooling duct to carry hot air from the engine compartment out through the fuselage between the undercarriage legs.

• **Tail surfaces.** The tail surfaces are built flat over the plan with half ribs. You'll add the undersides later and sand them to an airfoil shape. The stabilizer halves slide over tubes that are secured in the fuselage. The stab halves are held in place on the tubes by the rigging wires. To simulate the flying surfaces' narrow frames and trailing edges, ⅛2-inch ply parts are edged with narrow strips of balsa. The effect is quite convincing when

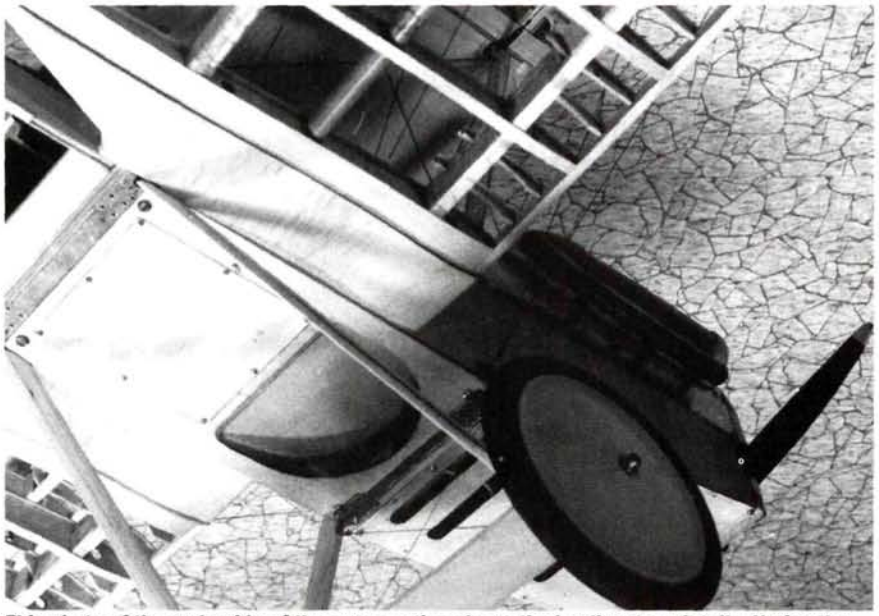
FLIGHT PERFORMANCE

The S.E.5a is easy to fly. After a complete preflight check and when you're confident that everything is as it should be (control surfaces working smoothly and in the correct directions!), warm the engine up, and make sure that it runs well at full throttle and has a reliable idle. If you built the hidden tailwheel on the tailskid, you can use a hard runway, but if you kept to a simple tailskid, stick to a grass runway. Biplanes with narrow-track wheels and tailskids are almost unmanageable on hard surfaces. The full-size aircraft had adverse aileron yaw because the ailerons were way out toward the wingtips. The model's first flight confirmed that it also had adverse yaw. It banked nicely with aileron input but it didn't turn at all until I applied rudder. I solved this problem by programming differential aileron (more up than down) mixed with a tad of rudder into my transmitter.

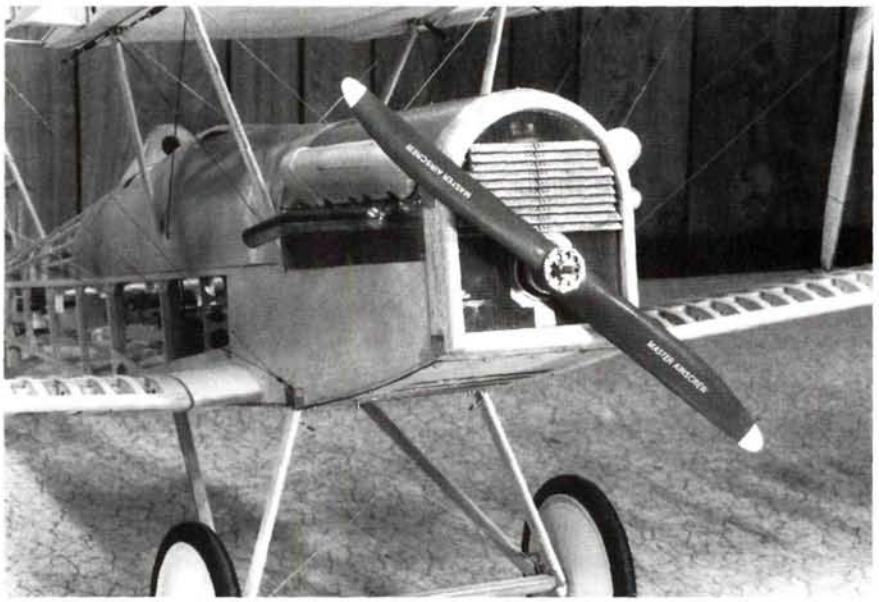
Like most WW I models, the S.E.5a is sensitive to crosswinds during takeoff and landings; a grass runway is your best choice. When you're ready to go, gently advance the throttle holding up-elevator and correcting any yaw tendency with rudder until the tail rises. You don't need full power to take off; just let the model fly off by itself.

Once aloft, the model is superb! You won't believe how easy it is to fly until you experience it. It's magical to see 1917 come to life again. The S.E.5a does mild aerobatics that are consistent with its design, and it does them in a scale-like fashion. It has done loops, rolls and Immelmann turns as only a bipe can do them. I mostly enjoy flying it around easily and gracefully, admiring this fighter as it flies past.

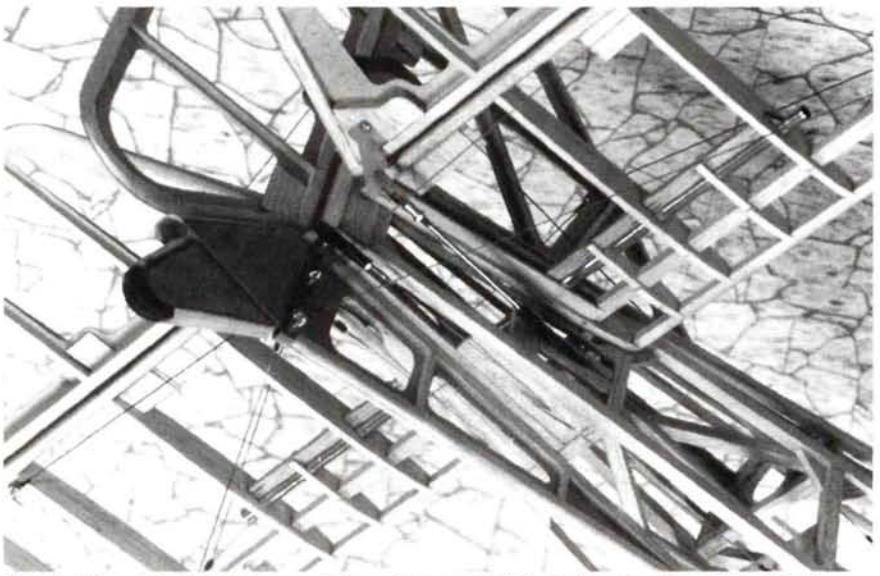
Set up for landing as you would for any large model: throttle back to about ¼ to reduce speed, and feed in some up-trim to maintain altitude until you are ready to descend. Then decrease power to begin your descent. When landing, the S.E.5a doesn't have any bad habits, though narrow-track biplanes tend to tip onto their noses easily. Don't try to land too fast; just let the model settle onto the ground while carrying a little power, close the throttle gently just as the wheels touch down and then hold hard up-elevator. Another successful mission!



This photo of the underside of the nose section shows the landing-gear details. Notice the exits for hot air to escape from the engine compartment.



I put a fine wire mesh over the model's nose to allow cool air to flow over the engine.



The stabilizer is built in halves and then slid over retaining tubes. Don't omit the flying wires; they're functional!

the structure has been covered. The fin, rudder and elevator plywood profiles have cutouts to accommodate nylon hinges; this minimizes the need to cut hinge slots in the stabilizer and balsa tail block.

• **Wing construction.** The wings are best built on a jig; go as far as you can toward completing them before you remove them from the jig. Make the wingtips out of two laminations of 1/32-inch ply that you form to the camber shown on the plan. If the wingtips aren't cambered, they won't fit properly.

The ailerons are built as part of the wings and then cut free and finished; small Robart Hinge Points secure them to the wing. To fit the servos inside the thin wings, I show custom low-profile servo mounts. With small changes in dimensions, they'll fit any small servo. The S.E.5a is a big model, but it flies slowly and doesn't need huge, high-torque servos.

• **Cockpit detail.** The cockpit is wide open and benefits from detailing. I installed cockpit seat supports and a wicker seat made out of cane and raffia, which looks very authentic. The pilot seat can be set on the supports to accommodate a hips-to-head pilot figure. The "Vickers gun butt" protrudes into the cockpit over the left of the instrument panel.

• **Final assembly.** After the model has been built but before it has been covered, install the radio and its components. Position the radio gear as appropriate. I used rubber bands to mount my receiver and battery on the tank compartment cover, and I mounted the switch and charger jack inside the cockpit. I also ran the receiver antenna through a tube in the fuselage; it's invisible and functions well.

SPECIFICATIONS

Model: S.E.5a

Type: scale WW I biplane

Wingspan: 71 in.

Length: 56.5 in.

Wing area: 1,862 sq. in.

Weight: 15 to 16 lb.

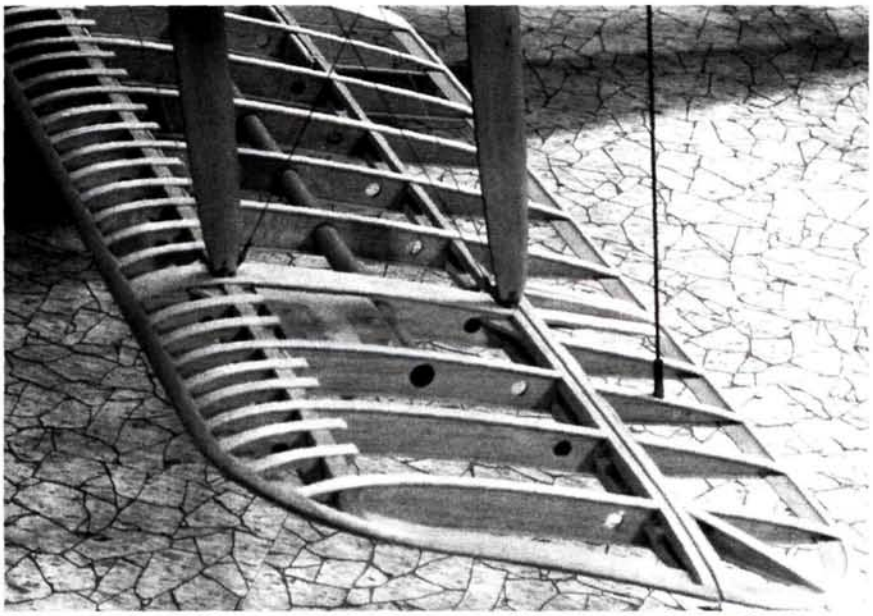
Wing loading: 19.18 oz./sq. ft.

Engine req'd: 1.20 to 1.80 4-stroke

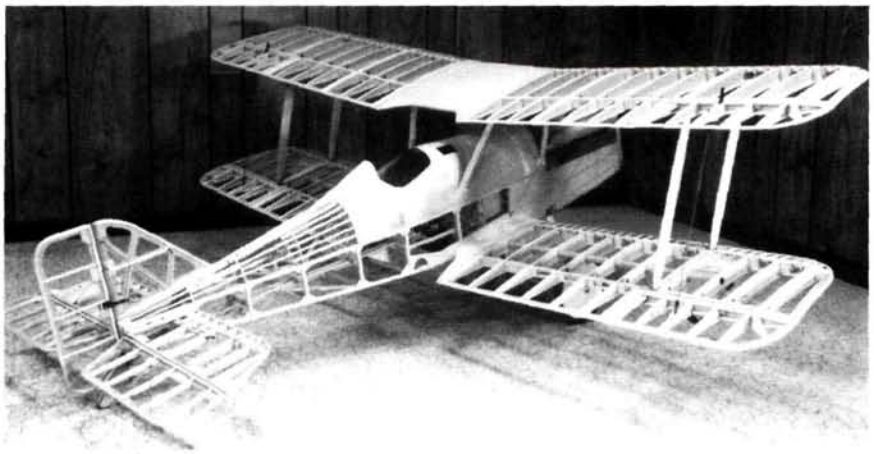
Engine used: YS 1.20 4-stroke

Radio req'd: 4 channels (rudder, elevator, aileron, throttle)

Comments: this IMAA-legal biplane requires traditional balsa and plywood construction techniques; the CAD plan is highly detailed; airframe construction closely follows that of the full-scale aircraft it replicates; intended for experienced builders.



Scale construction techniques are used throughout; note the false ribs on the wing's leading edge.



Framed and ready to cover. Bare bones always look good!

I faithfully reproduced the S.E.5A down to the most minute detail. Finishing touches like this gun really make a scale model.

A computer radio is needed to program differential aileron and to coordinate rudder/aileron mixing. At first, I used glow heat on the engine when it was idling, but it tended to speed up the idle after the engine had been running for a long time, so I removed it. I used a microswitch that engages at low throttle. A newer, onboard glow system that senses when the plug is cooling, regardless of engine speed, would work better.

• **Covering.** The best way to simulate a wooden framework covered with doped fabric is to use doped fabric! Cover the wooden framework with appropriate fabric that, for scale effect, must be strong and have a fine weave. Fabric shops often stock a light, durable white nylon material that's just right.

Doping fabric is tricky because the weave will fill with dope quickly but unevenly; and by the time all the pinholes have been filled and you've applied the color and added the details, the fabric

Ready for another takeoff roll! The smoke puffs coming out of the exhaust pipe look realistic.

click trip MODELAIRPLANENEWS.COM SEE COMPLETE BUILDING INSTRUCTIONS

S.E.5a WW I SCOUT
FSP0703A

Designed by John Simmance, the S.E5a is IMAA-legal and uses traditional balsa and plywood construction techniques. The highly detailed CAD plan of the airframe construction closely follows that of the full-scale WW I aircraft. This model is for experienced builders. WS: 71 in.; L: 56.5 in.; power: 1.20 to 1.80 4-stroke; radio: 4-channel; 6 sheets; LD: 3. $29.95

S.E.5a PARTS
For laser-cut parts, contact Lasercut USA (772) 879-9696 (Pat Fallacaro); pjf610@yahoo.com; lasercutusa.com.

weave isn't visible. To avoid this, I first cover the airframe with ordinary tissue, then I water-shrink it and dope it to tighten it fully. I then stretch the damp nylon over the tissue and stick it to the tissue with thinned dope. The first coat of dope will "blush" and look horrible, but the second coat will clear it. This process takes less clear dope, it's lighter and, after all the color finish has been sprayed on, you can still see the fabric's weave.

I simulate fabric lacing by stitching a zigzag along a strip of folded cloth (on paper backing to prevent the cloth from being scrunched up). I then cut away the backing and "dope" the strips onto the covering.

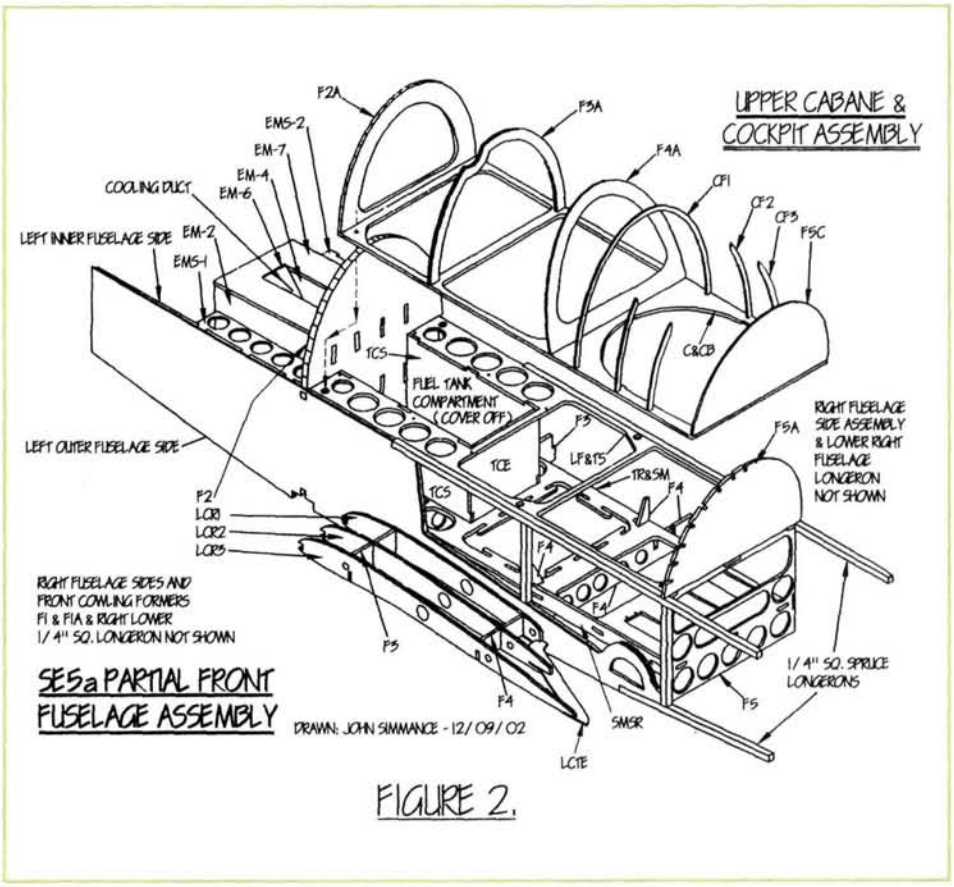
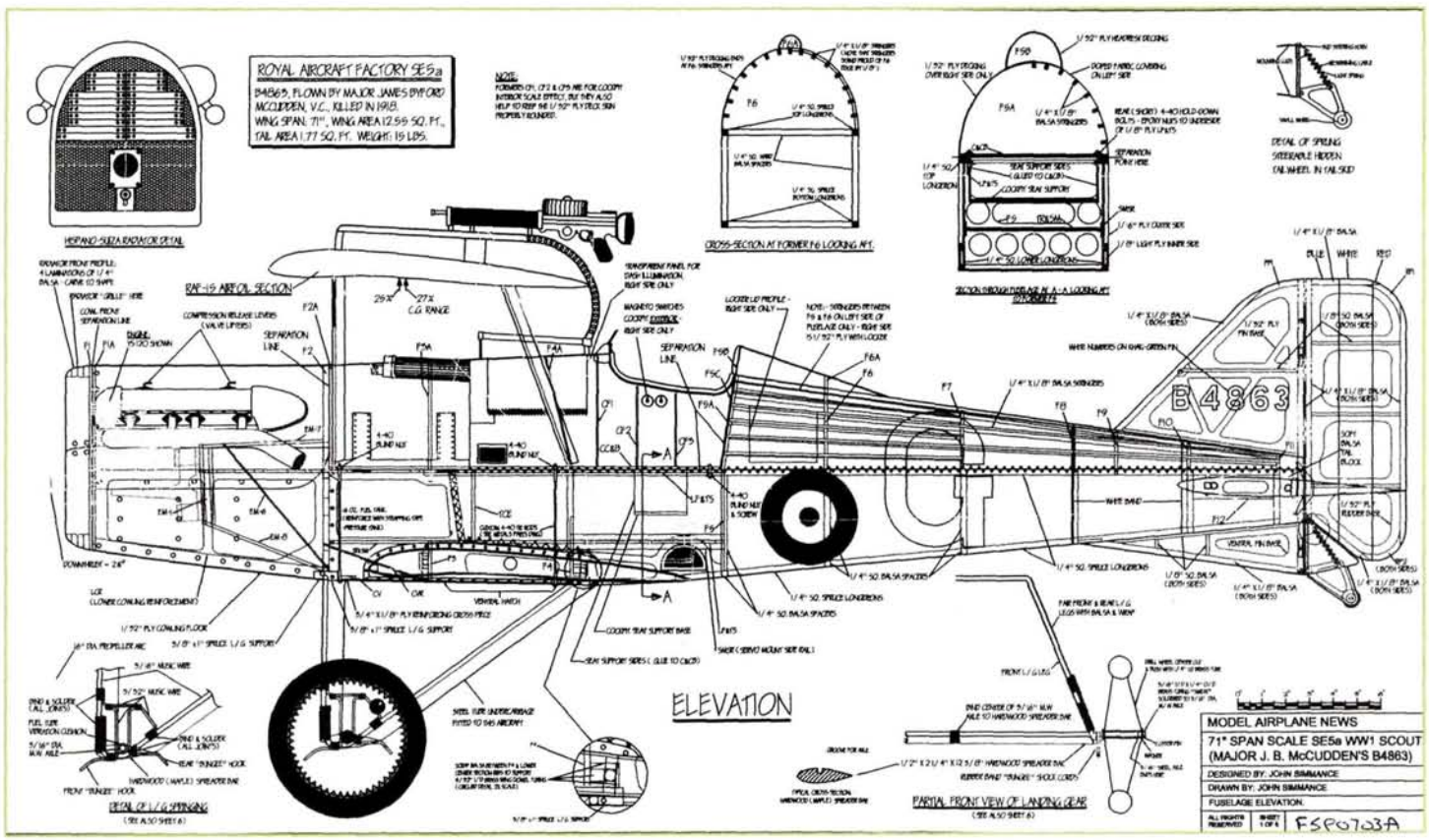


FIGURE 2.

If you like scale WW I models, this S.E.5a is for you. In addition to being a builder's delight, this IMAA-legal biplane is a pleasure to fly because it performs well. I hope you enjoy building and flying your S.E.5a as much I enjoyed designing it. ✈

Robart Mfg. (630) 584-7616; robart.com.



Paint plastic film

Low-effort makeover

by Rick Bell

It's easy to change the look of an ARF model. It's hard to believe that this is the same plane.

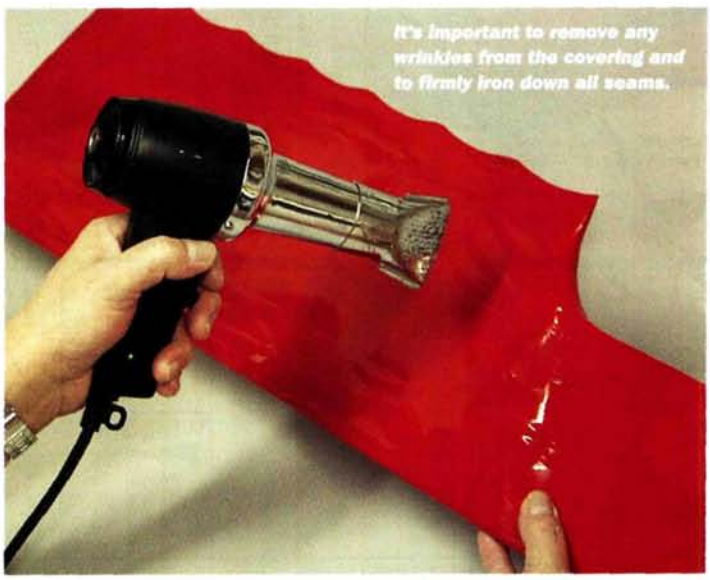
The Fokker Dr.I triplane has always been on my "must-build-someday" list, but I never got around to building one; I guess it must be all those wings. So when Great Planes released an almost-ready-to-fly (ARF) version of the Dr.I, I just had to get one. For me, though, there is only one problem with ARFs: they tend to look alike. I like my models to look different from the other guys', so I like the challenge of customizing them with minimal effort.

I've found that models covered with a heat-shrink plastic film can be painted with a few simple preparations, and I've used this technique for a few years with excellent results. For this project, I used the Great Planes ARF Fokker Dr.I triplane and Top Flite, LustreKote and Krylon paints. My inspiration was the vibrant orange and green triplane that was pictured in the May 2003 issue of *Model Airplane News*. I thought this would make a very colorful model—one that you wouldn't see every day at the flying field. Here's how I did it.

BEFORE YOU START

Before starting any project, it's a good idea to research the subject and gather the tools and supplies needed (see the "You need" sidebar). I found a large poster of the triplane that proved to be very useful for color reference. Also, if you use spray paint, be sure to use it in a well-ventilated area, and be sure to wear a mask that's designed for spray painting (to protect your lungs).

Before you start the makeover, round up your tools, supplies and reference material. Having everything on hand saves time.



It's important to remove any wrinkles from the covering and to firmly iron down all seams.

FIRST STEP

I find it's best to start the color-change process with an unassembled model; it's easier to work on individual parts than on an assembled airframe. I removed the wrinkles and firmly ironed down the airframe covering—including the seams. It's important to do a good job here; it will make scuffing the film easier and will result in a smoother finish.

I use an automotive finishing pad to scuff the film before I paint it.

PREPPING THE FILM

To provide a proper base for the paint to adhere to, the film must be thoroughly scuffed.

Workshop secret: go to your local auto-parts store paint section and get a few of the 3M pads that are made for sanding automotive finishes. They come in several grades, and I've found that the pads marked "Very fine" are perfect for scuffing plastic film. These are abrasive enough to thoroughly and smoothly sand the film, yet the pad makes it difficult to sand through the film when you hit an edge (as on a rib). As an alternative, you could use 000 steel wool, but I think the 3M pads work better. Under no circumstances should you use wet-or-dry sandpaper for the scuffing; it will cut through the covering very easily.

I like to start with the wing because it requires the most scuffing. With a flat palm, sand the film parallel to the ribs; be careful not to cut through any edges. On solid sheeted surfaces such as the wing's leading edge, you can sand spanwise. This technique also applies to scuffing the film on the rest of the model. Take your time and completely scuff every surface that will be painted. When the film takes on a "frosted" look, it will be sufficiently scuffed. Now use a terry-cloth rag that you've moistened with rubbing alcohol, and thoroughly wipe all of the covering to remove sanding dust and finger oils.

Scuff the film until it takes on a "frosted" look and then thoroughly clean it with a clean terry-cloth rag and rubbing alcohol.

WORKING ON THE WINGS

For this project, I masked and painted the wings first. I masked the wing crosses and their white backgrounds. Workshop secrets: for sharp, crisp lines, I use ¼-inch 3M plastic masking tape, and to protect large areas from paint overspray, I use an automotive masking paper. You can find these in the paint section of an auto-parts store. Avoid using newspaper for masking. It will leave ink stains, and the paint can seep through the porous newspaper.

Because I wanted a darker shade of orange than I could get with the orange paint applied over white primer, I sprayed LustreKote orange directly over the red MonoKote when I painted the wings.

Workshop secret: placing the spray can in a pot of warm water for a few minutes before painting helps the paint to flow out more smoothly. If you can't comfortably place your fingers in the water, let it cool before you immerse the paint can.

When you mask the parts, be sure to mask the flying surfaces at the same time; this way, the different colors will line up when they are applied.

I sprayed the orange paint directly over the red film to obtain a darker shade.

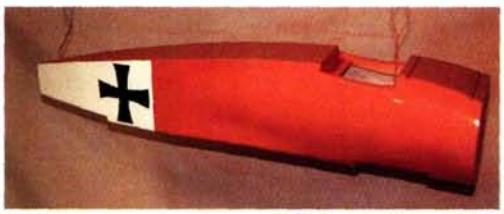
After the orange paint had dried, I sprayed white primer on the areas that were to be covered by the green Krylon. When the primer had dried, I applied the green. When you use different brands of paint, spray some of each on a test panel to make sure they're compatible. I found that the Krylon could be applied over LustreKote, and that surprisingly, LustreKote flat clear could be used over the Krylon with no adverse reactions. Here's the completed top wing with the flat clear applied.

After the orange paint has dried, spray on the white primer for the green paint.

The wing with all of the colors applied.

This design required that the ARF's original crosses and their white backgrounds be moved to the rear of the fuselage. I simply peeled off the crosses.

I painted over the white with red so that when I applied the orange, it would have the same tone as the rest of the model.



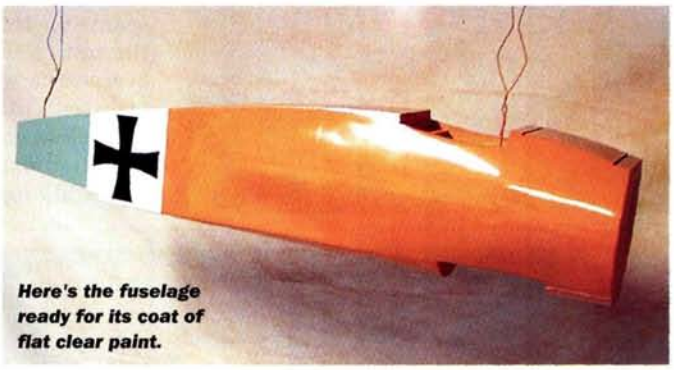
I made new crosses and applied them before adding the green paint.

BODY SHOP

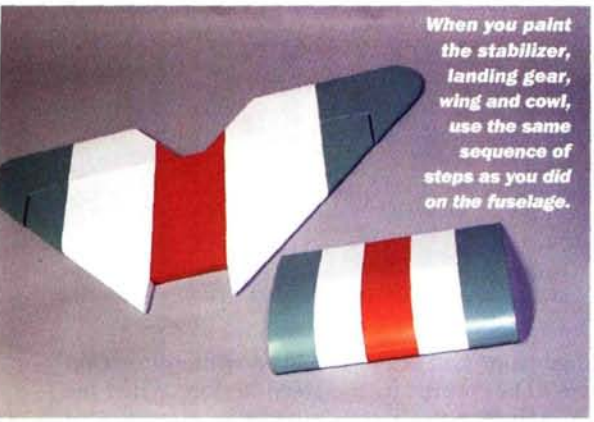
I tackled the fuselage next, and it presented a challenge. For the scheme that I was duplicating, the cross and its white background that were already on the ARF were too far forward; the design needed to be moved aft and placed next to the stabilizer.

The cross was made of ironed-on MonoKote, and I simply peeled it off. I decided to leave the white on the model, but I painted over it with LustreKote dark red so that when I sprayed on the orange, it would have a uniform tone. The painting sequence of the fuselage was a little different from that of the wings'. After I had applied the red, I added white primer to the rear of the fuselage. This provided the proper background for the green and for the cross.

After the primer had dried, I masked it and sprayed on the orange. While it was drying, I made new, smaller crosses for the fuselage from a MonoKote black trim sheet. To make the crosses in the proper shape and size, I placed the rudder on a photocopier machine to make a copy of the cross. I used this as a template, and the copier reduced it to the size I needed. From this, I made a stencil to cut the crosses out of the trim sheet. When the orange paint had dried, I applied the crosses, masked the white and sprayed on the green Krylon. When that had dried, I removed the masking, and the fuselage was ready for the flat clear.



Here's the fuselage ready for its coat of flat clear paint.



When you paint the stabilizer, landing gear, wing and cowl, use the same sequence of steps as you did on the fuselage.

FINAL DETAILS

When you paint the stabilizer, landing gear, wing and cowl, you should follow the same process: scuff, spray primer, mask, spray red for orange, spray orange, spray green and flat clear. The rudder on this model needs only to have flat clear sprayed onto it. Also, make sure that you paint the landing gear, cabane struts and other odds and ends. When all of the parts have been painted, let them cure for a few days and then assemble the model following the kit's instructions.

There's no doubt that ARFs have had a huge impact on our hobby because they allow us to fly models we don't have the time to build. I just don't like the "cookie cutter" aspect of ARFs, but with a little work and thought, an ARF model can be changed and personalized to suit your tastes. It was easy to transform the triplane's looks, and I now have a unique model that really turns heads wherever I fly it. Before you assemble that next ARF, why not try to give it a different look? You will be glad that you did! ✈

YOU NEED

- LustreKote in orange, dark red, white primer and flat clear
- MonoKote black trim sheet
- Top Flite heat gun and trim iron
- Krylon Slate Green
- 3M "Very fine" sanding pads
- 3M ¼-inch plastic masking tape
- 1- and 2-inch-wide masking tape
- Automotive masking paper
- Terry-cloth rags
- Rubbing alcohol

Great Planes Model Mfg. (800) 637-7660; greatplanes.com.
***LustreKote;** distributed by Great Planes Model Distributors Co.*
***MonoKote;** distributed by Great Planes Model Distributors Co.*
***Top Flite;** distributed by Great Planes; top-flite.com.*

BEFORE

AFTER

The benefits of offset scale hinging

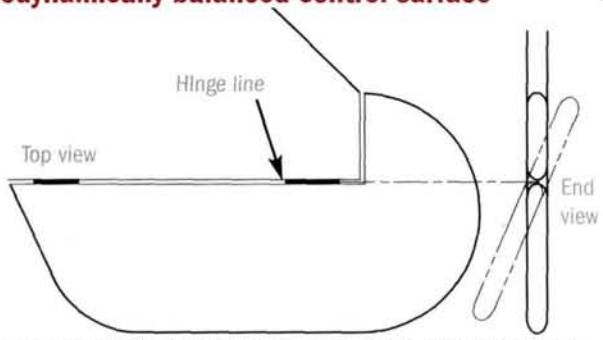
A scale model deserves scale hinges; they look better, they lessen the load on the servos and battery pack, they are more effective than commercial hinges, and they are easier to install and to set up. Scale hinges contribute much to a model's appearance, but let's look more closely at the other benefits.

The hinge line, or pivot point, on a scale hinge is offset back from the leading edge of the control surface. This arrangement provides a "balanced" control surface that eases the servos' workload and so lowers the radio's battery drain.

There are two types of control-surface balance: aerodynamic and static.

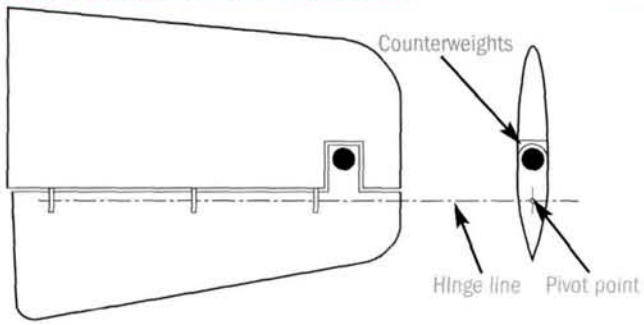
Scale models such as the author's Heinkel He111 H-6 Blitz Bomber deserve scale hinges. Offset hinges look better, and they have other benefits, too.

1 Aerodynamically balanced control surface



As the surface is deflected, the portion in front of the hinge line helps balance the airflow pressure of the portion behind the hinge line.

2 Statically balanced control surface



With a statically balanced control surface, the counterweight in front of the hinge line balances the weight of the control surface behind the hinge line.

Aerodynamic balance means that when the control surface moves in one direction, the part of the surface that's in front of the hinge moves in the opposite direction (Figure 1). The airflow over the front surface helps to push the control surface that's behind the hinge line in the desired direction. This reduces control loads, and it often makes the surface more effective because of improved airflow.

Static balance means that the weight of the surface in front of the hinge offsets the weight that's behind the hinge line. The distance the counterweight is from the hinge line also contributes to the balancing act (Figure 2). Statically balanced controls are much less apt to flutter, and since the servo doesn't hold up the full weight of the control surface, its load is greatly reduced.

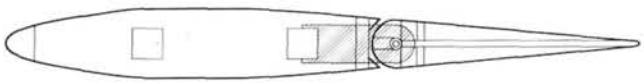
With the exception of exposed leading-edge hinges and large hinge gaps that are typical of early full-size aircraft (such as Piper Cubs), scale hinges make control surfaces more effective because of the improved aerodynamics: less drag is created when the surface is deflected (Figure 3). Scale hinges can be easier to set up, too, because you can use one pin to hinge the entire surface. A long, single hinge pin eliminates the misalignment and binding than can be caused by several shorter hinge pins. A single hinge pin can also be a lot easier to remove, and that greatly simplifies the installation, adjustment and removal of the control surface.

PHOTOS BY VANCE MOSHER

Hinge installations

3

Typical commercial hinge.



Offset scale hinging.

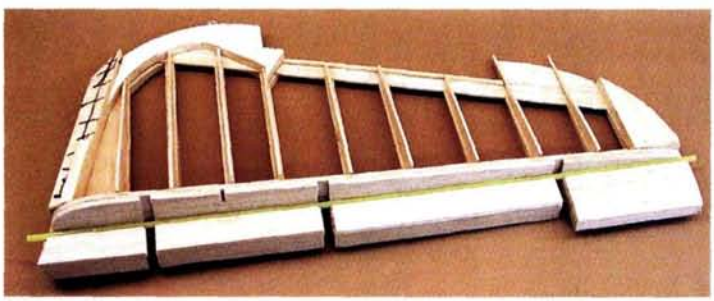
Scale hinges are more aerodynamic and cause less drag.

SCALE HINGE SETUP

Here is one way to make scale hinges. Although it looks as if it would be complicated, scale hinging isn't difficult. First, a tube is installed as a hinge tube along the center of the control-surface's hinge line, and notches are cut in the tube so that it will clear the gudgeons (separate hinge supports). A stiff wire (the hinge wire) runs through the tube sections, and it passes through holes that have been drilled in the gudgeon supports.

After they have been captured with the hinge wire, the gudgeons are glued into place in the model's fixed surfaces. Notches that fit the gudgeons are cut into the fixed surfaces as you go. For small models, the gudgeons can be made of 1/16-inch ply; use 1/8-inch ply for larger models. For a very large, giant-scale model, you should use 1/4-inch ply gudgeons, and they should be inset into the fixed surface—not butt-glued to it.

In the control surfaces shown here, I used a yellow (inner) Nyrod tube with a 1/16-inch inside diameter (i.d.); it is strong enough for models with engines up to 2ci. For smaller models, a 1/32-inch-i.d. tube would be strong enough, and in giant models, a 3/32-inch-i.d. tube should be used.

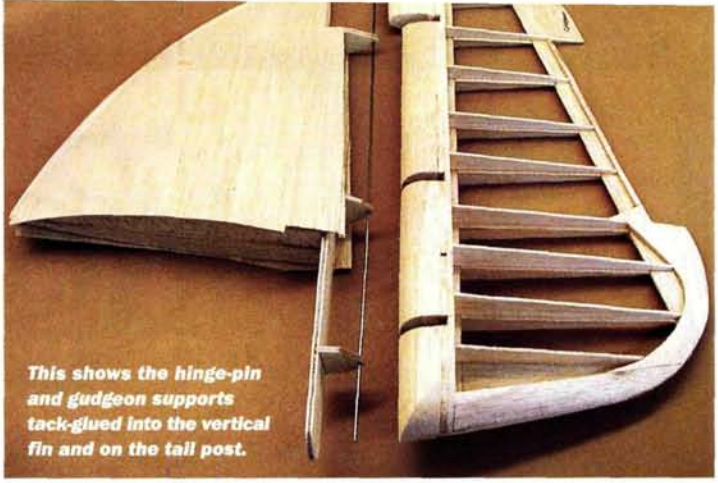


The spacer sheet, leading-edge blocks and hinge tube have been added to the control surface's main spar. When the rest of the blocks have been added and sanded to shape, the tube portions in the notches will be cut away.

For tapered, built-up control surfaces, if you use a center core sheet that is the same thickness as the outside diameter of the hinge tube, it will make the process a lot easier. Draw a centerline on the front spar, and glue the spacer sheet and leading-edge blocks between the slot locations; then glue the hinge tube into place. To ensure that the tube remains straight, nest it along the inner corner between the spacer sheet and the blocks. Leaving the wire in the tube during installation will also help to keep the hinge tube straight.

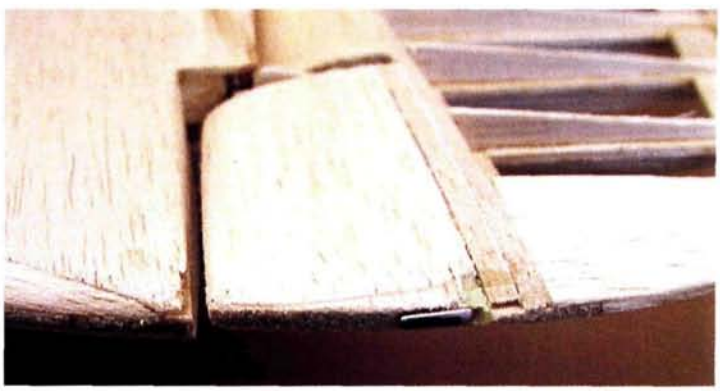
To keep glue out of it during construction, cut the tube so that it's longer than the control surface and sticks out at each

The ply gudgeons have been inserted into the rudder notches and are captured by the hinge pin.



This shows the hinge-pin and gudgeon supports tack-glued into the vertical fin and on the tail post.

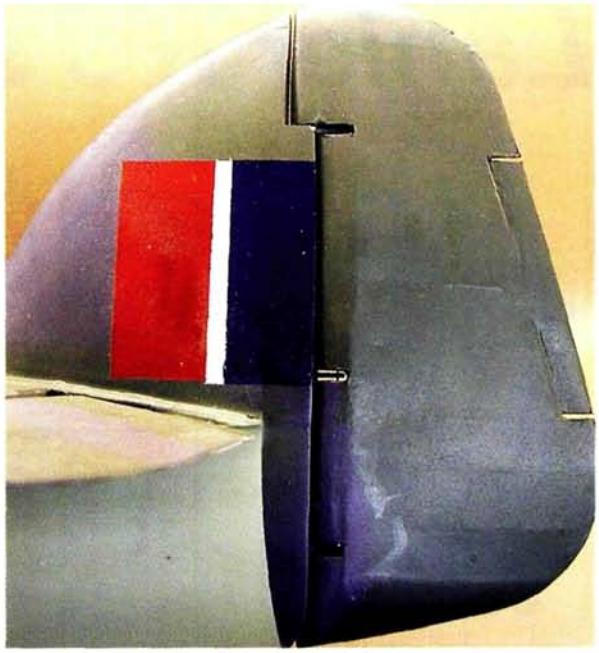
The fin and rudder hinged together.



At the very tip of the rudder, you can see the bent end of the hinge wire resting in a slight recess. A dab of canopy glue is all that's needed to secure the wire.

end. So it won't slip inside the tube, the wire should be longer than the tube. Make sure that the spacer sheet is thick enough to ensure that the structural spar is far enough behind the hinge line to allow room for the rear edges of the hinge supports. This is usually about ⅛ inch for small models and ¼ inch for models .40 size and larger.

Space the control-surface hinge notches to match the spacing of the gudgeon notches in the fixed surface. To prevent the control surface from sliding sideways on the wire, cut the hinge notches (in the tube) just a little bit wider than the plywood gudgeon supports. Remove the wire from the tube and cut away the tube section in the notch with a thin razor saw, band saw, or jigsaw. Make sure that the cuts are square to the control surface.



The completed fin and rudder on the author's Fairey Firefly.

To install the control surface, slide the hinge wire into the tube; be sure to capture the gudgeon supports in each notch with the wire. Slide the gudgeons into the notches in the fixed surface and tack-glue them into place. Don't force the supports into the notches; for the hinges to operate properly, all the gudgeon holes must be in a straight line. After the gudgeons have been tack-glued, pull out the hinge wire, remove the control surface and sight through the gudgeon holes; you should be able to see through all of them in a row. When you're satisfied with the hole and wire alignment, securely glue the gudgeons into place.

Another example of offset scale hinges on the author's Vultee Vanguard rudder.

Trim the ends of the tubes flush with the ends of the control surface. Bend one end of the wire (about ¼ inch) into an L-shape, and trim the wire so that it is slightly shorter than the control surface. With a file, smooth both ends of the wire and taper one end to a dull-pencil point; this will make the wire easier to install. Cut a recess in one end of the control surface—about ⅛ inch—for the wire L-bend to be set into. You should be able to grab this end of the wire to remove it from the control surface.

Flex the control surface back and forth to check the gaps and clearances. The surface gaps between the movable and fixed surfaces should be as small as possible, but be sure to remember to leave a space that's about the same thickness as the covering material and surface finish that will be added to the control surface. The control surface should move very freely throughout its entire motion range. It should move around the hinge pin easily but with minimum hinge slop. To secure the hinge wire, use a dab of clear, flexible canopy glue on the inset, L-bend end of the wire. The glue will be easy to peel away when you need to remove the control surface.

That's it! The whole procedure sounds a lot more involved than it really is. It's quick and relatively easy to do, and offset scale hinges make your scale model easier to work on, they look and fly better, and they lessen the servo and battery loads.

***Sullivan Products** (410) 732-3500; sullivanproducts.com.*

Carlson MP Jet .061

Big-engine performance and features in a small package

The MP Jet .061 BB/RC (ball bearing/remote control) is imported from the Czech Republic by Carlson Engine Imports of Phoenix, AZ. MP has produced small diesel and glow engines for sport and competition use since 1994. Its line includes five other glow versions of the .061 RC engine, including marine, control-line and diesel control-line versions! MP also makes several "replica" engines.

Carlson Engine Imports, owned by Ed Carlson, is well known in the U.S. for importing glow and diesel engines since 1983, with a special emphasis on diesel. According to Ed, diesel engines are very popular in Europe and other parts of the world but not here in the U.S. Nevertheless, he offers more than 250 types of diesel engines from all over the globe!

The MP Jet .061 BB/RC is a high-performance sport or competition glow engine that's capable of high rpm and high output with a wide range of props and fuels, depending on your needs.

KEY FEATURES

An impressive feature of this engine is its scaled-down looks. It could easily pass for a miniature .61. The MP .061 incorporates all of the performance features found in a much larger engine, such as a twin-needle-valve carburetor, dual ball bearings, Schnuerle porting and a standard bolt-on muffler. This is a great approach to small-engine design!

Another key feature is a steel sleeve with a Meehanite iron piston fitted by lapping—a time-tested and proven design for engines of that size. The engine is supplied with three compression shims (all are 0.009-inch thick) that are used to fine-tune the compression ratio, depending on the intended fuel's nitro content, the model's airspeed, atmospheric conditions, rpm and load. The compression shims give competition-oriented owners the ability to optimize power output under specific operating conditions. The owner's manual gives rough guidelines for fine-tuning the compression ratio, but basically, lower compression (more shims) should be used with higher nitro fuels and larger prop loads. Conversely, higher compression should be used for lower nitro and smaller prop loads.

A sport flier may never need to change the shims after the first fitting, but it's nice to be able to fine-tune the engine for various conditions, if necessary.

Using 15-percent nitro in my test run, I found little difference in the way the engine ran with the assorted shim spacings. But with 0-, 1- and 2-shim spacings and using an APC 6x3 prop, there was a difference in rpm. The peak rpm were 16,200, 15,800 and 15,600, respectively.

The engine incorporates a "glow-head" design rather than a glow plug. The glow head, along with any compression shims, is held in place by the head clamp that's secured by four hex-socket-type bolts. The attractive black-anodized head clamp looks just like a conventional head with cooling fins. The replacement glow heads are easy enough to change, and they're available through hobby dealers or directly from Carlson. I would have preferred a glow-plug-type head that allowed me to use the wider selection of plugs available today.

A diesel version is also available. The nitro version can't easily be converted to diesel because this would require a different crankcase, piston, sleeve and head.

INSTALLATION

This engine has the standard type of "lug"-mount design that's found on larger engines for beam mounting. For radial mounting, MP offers a nice, reinforced-plastic mount that comes with all the fasteners required. MP also offers a solid-aluminum, bullet-style prop nut.

SPECIFICATIONS

ENGINE: MP Jet .061 BB/RC
DISTRIBUTOR: Carlson Engine Imports
WARRANTY: 6 months (by Carlson)
DISPLACEMENT: .061ci (1cc)
BORE: 11mm
STROKE: 10.45mm
PRACTICAL RPM RANGE: 3,500 to 20,000 (14,000 to 20,000 peak)
WEIGHT: 2.8 oz. (79g) w/o muffler; 3.5 oz. (98g) w/muffler
HEIGHT (overall): 2.1 in. (53.3mm)
WIDTH (overall): 1.32 in. (33.5mm)
LENGTH (overall): 2.642 in. (67.1mm)
SHAFT DIAMETER: 4mm, M4x0.7 thread
PRICE: $75 (suggested retail w/muffler)

HITS

- High performance.
- Twin ball bearings.
- Schnuerle porting.
- Twin-needle carb.
- Supplied head shims.
- Good throttle response.
- Muffler included.

MISSES

- Uses a glow head instead of a glow plug.

APPLICATIONS

Many electric-powered models (both ARF and kits) that would be suitable for the MP Jet .061 BB/RC-size engine are available; these include House of Balsa's Profile P-51 and Profile SU-31 and the Sig Rascal. Finding a simple electric motor that's equivalent to the MP Jet .061 isn't possible because of many variables, such as the model's weight and wing area. The best advice is to check with the supplier or manufacturer of the specific plane you're interested in converting and obtain their power recommendations.

Big-engine features: beam-mounting lugs, twin-needle carb, standard muffler, ball bearings, Schnuerle porting, four-bolt backplate!

The tiny carb has all the requisite features: twin needles, idle-stop screw, adjustable linkage arm and fuel-inlet nipple.

This cute little guy could pass for a scaled-down .61!

Here, the head clamp and glow head have been removed. Compres-sion shims are supplied to allow a full range of prop loads and nitro content.

Some of the accessories available from Carlson Engine Imports: spinner nut, radial mount and glow head.

BREAK-IN AND BENCH TESTING

I easily hand-started the MP Jet with a brisk flip, so I didn't need my electric starter during break-in and testing of various props. I followed the break-in procedures in the manual and found that they worked quite well. I recommend following the instructions to the letter, especially with the lapped piston/sleeve design.

To summarize: use a 7x3 to 7x5 prop, set the carb to full throttle, and regulate the rpm from 9,000 to 10,000 with the high-speed needle; continue this rich setting for 10 to 15 minutes, and then periodically lean the high-speed needle until the engine holds peak rpm without slowing or sagging. This will take about 30 minutes of run time.

I was especially curious to see how well the engine idled after break-in, since my experience has shown that small engines generally don't idle well. I was pleasantly surprised to find that the case with the MP Jet .061.; the idle was easy to hold at 3,500 to 3,700rpm. This may seem high compared with larger engines, but engines (and props) of this size produce very little thrust at this rpm.

I was able to reduce the idle speed and increase the reliability even more with a simple modification. When I disassembled the carburetor, I noticed that the inner end of the idle-mixture needle had been machined with a square end. I filed a slight (about 0.025-inch-long) taper on the end of the brass idle needle. Although the .061 already has a great idle, this slight modification makes it idle even better. This little engine easily accelerated to full power, even after several minutes of idling.

To my ears, the muffler provided little silencing effect, but it probably didn't reduce power much, either. I might consider bushing down the muffler outlet somewhat to reduce noise; as a bonus, I'll probably get an even better idle.

PROPS

The engine tolerates a wide range of prop loads without overheating. It ran well with various props that turned between 11,700 and 18,500, but it seems to run best with a prop that gives a static peak of around 16,000rpm. Ed Carlson suggested two props that I didn't test: the Cox 7x3½ (gray; 11 grams) and the Cipolla 7x3½ (black glass; 7 grams); you may want to give these a try.

CONCLUSION

I found that the engine was easy to start and operate. It's tolerant of a wide variety of props and fuels, and it produces plenty of power. I was most impressed by its "big-engine" features—especially the twin-needle carb that provided reliable low-speed idle with good acceleration to full throttle.

I would have preferred a glow plug rather than a glow head, but I do like the way MP integrated the glow head into the engine's design. The glow head, compression shims and finned head clamp are a well-designed assembly.

Overall, this is quite an impressive small powerplant—one that's well worth considering. The general quality of workmanship is excellent. If having "big-engine" features in a ½A plane sounds good to you, check out the MP Jet .061. ✈

PROP PERFORMANCE

PROP	PEAK RPM*	LOWEST IDLE RPM**
APC 7x4	11,700	3,400
APC 6x3	16,200	3,500
Windsor 6x4	16,900	3,400
APC 5.7x3	18,500	3,700

This data was obtained with Wildcat 15-percent nitro, 16-percent synthetic oil, 6 percent added Sig castor oil and an MP glow head without any head shims.

* *Never fly at peak rpm; back off by 200 to 300 on the rich side of peak for flight.*

** *For flight, as a safety margin, raise the idle rpm by 200 to 300 with the transmitter trim after adjusting the low-speed mixture for the lowest possible idle.*

APC Props; *distributed by Landing Products (530) 661-0399; apcprop.com.*

Carlson Engine Imports *(602) 863-1684; carlsonengineimports.com.*

Sig Mfg. Co. Inc. *(800) 247-5008; sigmfg.com.*

Wildcat Fuels *(859) 885-5619; wildcatfuel.com.*

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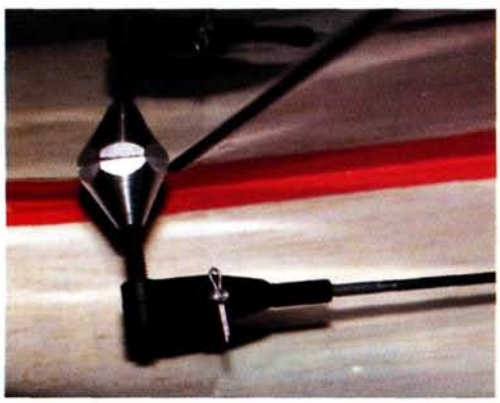
Du-Bro Products Inc.

Heavy-Duty Control Horn System

Big-bird hardware

Giant-scale models demand heavy-duty hardware, and one of the most important areas is the control system. With today's high-performance models, the control system must be up to the task. Enter Du-Bro Products' Heavy-Duty Control Horn System. Designed for big planes, each pack contains components to hook up two control surfaces, such as the ailerons or dual elevators. Included in the package are two each of the following: molded clevises for threaded 4-40 pushrods, 8-32x2-inch socket-head bolts, precision-machined aluminum pins, adjustable control horns, aluminum supports, molded washers and a bunch of steel cotter pins. The control horns are 1 5/32 inches long, and that makes them very versatile. If used on the ailerons, they can be installed so that the horn pivot point is in front of or behind the hinge line for differential throw. For normal installation, if the arm is too long, it's a simple matter to drill a new hole for the pivot pin where needed and cut off the excess arm length.



The system is super-simple to mount; you need only drill a 5/32-inch-diameter hole in the control surface for the 8-32 bolt. The bolt is then inserted into the molded washer and through the drilled hole. The washer has a recess for the bolt's head and a broad base for plenty of support. The aluminum support is then threaded onto the bolt, and it clamps (or locks) the control surface between them. Next, the control horn is threaded onto the bolt, and the clevis is attached to it with the steel pin. The linkages are then attached and adjusted for neutral. When set, the cotter pin is installed in the pin, and the legs are bent over to secure it. The procedure takes about 10 minutes.

Du-Bro has a winner on its hands with this Heavy-Duty Control Horn System. The parts are easy to install, easy to adjust and, at only $7.95 for a set of two, easy to afford. Why not give them a try on your next giant-scale project? I'm glad I did. *—Rick Bell*

Du-Bro Products Inc. (800) 848-9411; dubro.com.

Propwash Video

The 18th International Tournament of Champions

Showcase coverage of the greatest aerobatic competition

Propwash Video has just released its two-volume tape of the 2002 Tournament of Champions in Las Vegas. These tapes are full of high-flying action from the five-day competition and clips from the noontime flying demos. Both tapes include interviews with every contestant and selections from the Knowns, Unknowns and Freestyle performances. For hardcore enthusiasts, there is information on the event's history, prize distribution and copies of the official maneuver sheets as well as score summaries.

Tape One contains interviews with and performances by the pilots who placed eighth through 21st,

with special emphasis on the 4-minute Freestyle. Also included are many interviews with some of the hard-working, behind-the-scenes people who are responsible for this event. In addition, Tape One contains some great flying footage from the noontime demonstrations, including a helicopter performance you simply have to see.

Tape Two is totally dedicated to the top seven finalists and focuses on the fierce competition of the final day's events. The feel and flavor of the TOC are nicely displayed as you hear the competitors talk about—and watch them perform—their flights for the judges. The tape ends with the awards ceremony and the triumphant response from Chip Hyde as he joins the élite group of past TOC winners. The two-volume set costs $29.95 (plus $4.75 S&H). *—John Reid*

Propwash Video Productions (702) 731-5217; propwashvideo.com.

Pacific Aeromodel Mfg. Inc.

PAC-MF0502 Power Panel

Power up your engine and batteries

Never miss another day of flying because of dead batteries or glow plugs. With hookups for starting a glow engine and a field-charger section to quick-charge flight or transmitter batteries, the new PAC-MF0502 power panel is a great deal for $44.99. There is even a charging jack to revive a dead glow-starter battery.

The power panel fits a standard 5½x3½-inch mounting hole. Attach the power leads to your field box's 12V battery, and you're ready to go. Eight standard banana plugs are included, so all of your field equipment has access to the panel's power hookups. The starter provides continuous 12V power for your electric starter motor or to power an external rapid charger.

A 1.2V glow-power section of the panel provides two sockets for a glow-plug connector. Use the current-adjusting knob to control power to the glow plug. The same adjusting knob controls the current for recharging your dead glow-starter battery to provide a faster charge.

The highlight of the panel is its field-charging section. This area has hookups for a 4.5 or a 6.8V receiver battery and a 9.6V transmitter battery. The charger can accommodate both Ni-Cd and NiMH batteries. The peak-detect receiver charger will automatically change to a trickle charge when the battery has been fully charged. You can also discharge/charge your battery with a simple push of a button. The colored LED will always indicate the condition of your battery. The transmitter battery charger does not have these features, so never charge your transmitter battery for longer than 5 hours. Charging times vary, but 30 minutes should bring your transmitter gauge into the green. *—John Reid*

Pacific Aeromodel Mfg. Inc. (800) 780-0100; pacaeromodel.com.

KSJ

Universal Blade Balancer

Blade balancing made easy

To have a smoothly running helicopter, it's essential that all the rotating parts be balanced. The most obvious parts to balance are the main rotor blades; if they're out of balance, the whole helicopter shakes. There are many methods and tools to balance rotor blades, and the KSJ Universal Blade Balancer is one of the easiest to use and provides consistently fine results.

The balancer comes as a kit and is molded of high-impact plastic. It features a balance tray that's supported by ball bearings for minimal friction. The tray also has a bubble level indicator and adjustable weights to level it. The balancer comes with 2, 3 and 4mm posts that can accommodate most main and tail blades.

The KSJ balancer works in two ways: it balances each blade spanwise, and it balances each blade against the other. To test the unit, I used a set of blades that I knew were out of balance. I first balanced the blades spanwise, and the balancer showed me that both blades had the same center of gravity (CG)—a very good thing. All this meant was that one blade was heavier than the other. Next, I placed both blades on the balancer so see which was heavier. It was then a simple matter to place a piece of tracking tape exactly on the spanwise CG of the lighter blade until the blades were level with each other. When I bolted the blades onto my heli and lifted it off into a hover, the heli's performance was noticeably smoother.

The KSJ Universal Blade Balancer is an instrument that no heli enthusiast should be without. It's a high-quality tool that's easy to use for predictable results. The best part is that it costs only $45—a paltry sum for a smooth-running helicopter. *—Rick Bell*

KSJ; distributed by Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.

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NAME THAT PLANE

Can you identify this aircraft?

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We'll admit it; this aircraft was a bit obscure. In fact, only one was ever built. But a few of our readers were able to correctly identify May's mystery plane as the Beechcraft Model 34 Twin Quad. Congratulations to Joe Cox of Wichita, KS, for being among the aviation-identification élite. First flown in 1947, the Twin Quad was a 20-passenger V-tail feederliner capable of short-field takeoffs and landings. Powered by four 375hp Lycoming S-580 engines (two completely enclosed in each wing) turning just two props, the 70-foot-wingspan Twin Quad had a range of more than 1,400 miles. Any future plans for this truly unique aircraft were abandoned when it crashed on takeoff during a 1949 test flight. The aircraft and the test crew were lost, and future plans for the program were eventually abandoned.

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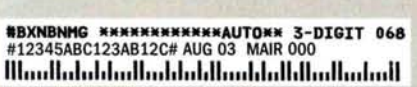

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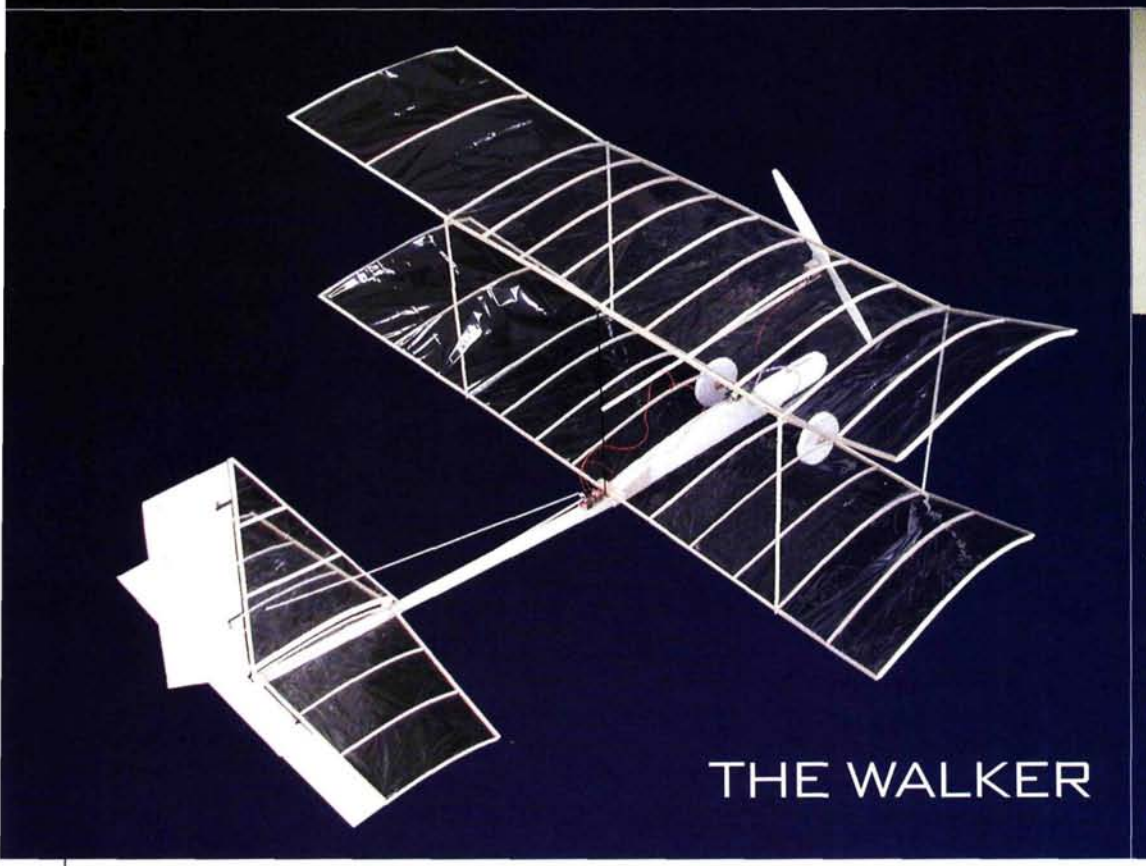
BY DAVE ROBELEN

ULTRA-SLOW LIGHT FLYER



SPECIFICATIONS

Wingspan: 25.5 in.

Length: 25.75 in.

Wing area: 357 sq. in.

Weight: 29g

Wing loading: 0.4 oz./sq. ft.

Power: KP-00 motor geared 7.5:1

Prop: 7x1.8

Battery: 170mAh Li-poly single cell

Flight duration: more than 15 min.

RC system: Dynamics Unlimited RFFS-100 magnetic actuators

No. of channels: 3 (throttle, rudder, elevator)

Designed in response to a conversation about very slow-flying indoor RC models and being able to fly in confined areas, the Walker cruises at 3.5 to 4mph and easily flies alongside me as I walk leisurely. I designed this ultralight model around a simple, inexpensive drive system and kept the airframe as sturdy as possible. The biplane layout concentrates a large wing area in a more compact model, and this results in tighter turning ability. It also helps to use very generous control surfaces that have a lot of deflection! Walker's layout and structure closely follow design practice in indoor free-flight duration events, where experience has shown that properly selected balsa can be a bit lighter than composite materials. The key words here are "properly selected." Very little wood is actually used in a model of this type, so it's worth the extra effort to choose the best. I designed Walker to be as small as possible so that it could use a magnetic proportional-control system. The Dynamics Unlimited RFFS-100 has worked out very well in Walker. I used a Dynamic Web Enterprises kit to convert these actuators to push/pull operation.

When it comes to the power system, the choice is simple: the incredibly light 170mAh Li-poly cell provides quite a lot of flying time—more than 15 minutes!—on a charge. The motor in the KP-00 drive is a good choice for a combination of power and light weight. Because the model is so large and "draggy," I used a motor-gear ratio of 7.5:1. The key is to keep the motor running at its efficient speed (about 30,000rpm) while using as large a diameter prop as possible (in this case, 7x1.8!).

I built the Walker fuselage with a balsa-box tail boom and a foam front. Because I enjoy indoor landings and takeoffs, I made landing gear with a 0.040-inch-diameter carbon-fiber axle and thin foam wheel discs reinforced with thin balsa at the hubs. This assembly is glued to a balsa plate that I taped to the bottom of the nose. The entire gear assembly weighs 0.70 gram, so I felt justified. Although it's very light, the Walker can easily withstand colliding with obstacles without sustaining any damage.

For covering, I used 2-micron clear Mylar from Dave Lewis that I left slack so that Walker wouldn't twist like a pretzel. It's also pretty neat to watch the covering respond to the air loads—something that isn't usually possible.

By the second flight, I was easily keeping the model within a 12x16-foot area. Walker is flown a bit differently from hot outdoor models. Although I use rudder for turns, the throttle is the primary control for going up and down, with elevator functioning more as a trim control. The piloting technique places more emphasis on manipulating the throttle than just barreling around wide open. The Walker will lift off from a standing start in about 4 feet and has a very peppy rate of climb. ✦

Editor's note: Dave Robelen's Walker will be featured as a Plan of the Month in an upcoming issue of our sister publication, RC MicroFlight.